Y-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

MAY 25

CONTENTS INDEX PAGE 9

THE IRON AGE

DUCTION -:- MANAGEMENT MAY 24, 1934 PROCESSES -:- NEWS

GRANITE CITY STEEL CO

THE FIRST PRODUCER OF OPEN HEARTH TIN PLATE IN AMERICA

TINPLATE

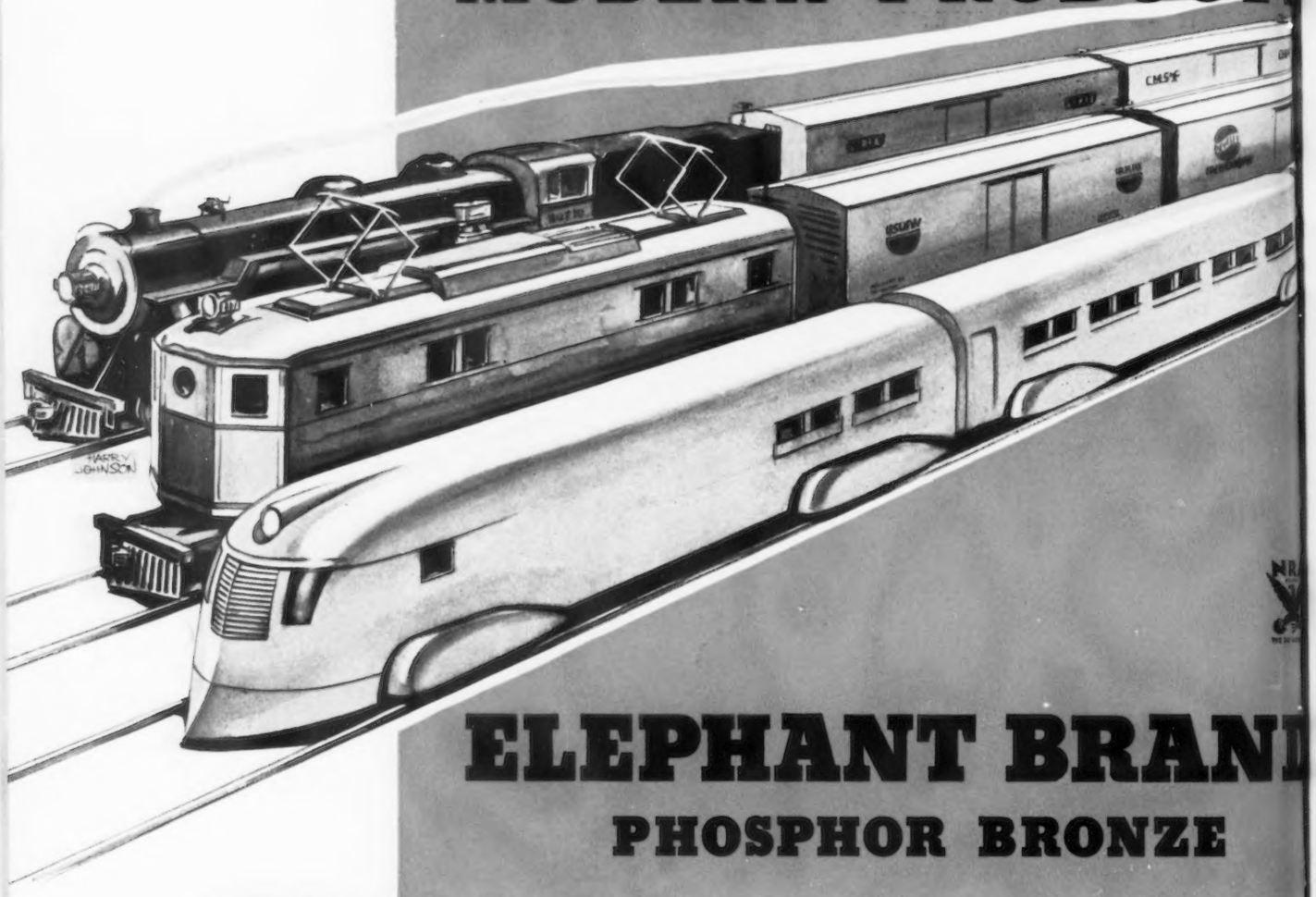
BETTER shearing—the only tin plate sheared on both ends and both sides at the same time. Can't be out of square.

Lithographs better—Solders better because it is cleaned by a special process used only by this company.

GRANITE CITY STEEL CO.
GRANITE CITY ILL.

SINCE GRANITE CITY STEEL 1878

Time-proven PHOSPHOR BRONZ for the most MODERN PRODUCT



ELEPHANT BRAND PHOSPHOR BRONZE

ELEPHANT BRAND
Phosphor Bronze
"PHOSPHOR BRONZE"
REG. U.S. PAT. OFF.

The service record of Elephant Brand Phosphor Bronze in the transportati field gives ample proof of the ability of this material to stand up under th most severe conditions. This is gruelling, testing service indeed! • Its hard ness, toughness, durability and elasticity, in addition to anti-friction qualiti recommend it for many applications in innumerable kinds of machinery or equipment • Why not investigate the possibilities in Elephant Phosph Bronze for your use? • It is made in just the right analysis for every purpos Furnished in the form of ingots, castings, rods, wire sheet, ropes and tubin

THE PHOSPHOR BRONZE SMELTING CO

2200 WASHINGTON AVENUE · PHILADELPHIA, P

INGOTS · CASTINGS · RODS · WIRE · SHEETS · ROPE · TUBIN

THE IRON AGE, published every Thursday by the *IRON AGE PUBLISHING CO.* Publication Office: N. W. Cor. Chestnut & 56th Sts., Philadelphia, Pa. Executive Offices: 239 W. 39th St., New York, N. Y., U. S. A. Entered as second class matter at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 133, No. 21.

▲▲ THE IRON AGE ▲▲ May 24, 1934 ▲▲

J. H. VAN DEVENTER, *Editor*
F. J. WINTERS, T. W. LIPPERT, F. L. PRENTISS *Cleveland*
G. L. LACHER, *Managing Editor*
G. EHRNSTROM, JR., *Pittsburgh*
R. A. FISKE, *Chicago*
W. W. MACON, *Consulting Editor*
A. I. FINDLEY, *Editor Emeritus*
T. H. GERKEN, *News Editor*
BURNHAM FINNEY, *Detroit*
L. W. MOFFETT, *Washington*
R. E. MILLER, *Machinery Editor*
GERARD FRAZAR, *Boston*
R. G. MCINTOSH, *Cincinnati*

NRA MEMBER U.S. WE DO OUR PART

Contents

Price-Fixing Versus Cost Cutting 11
Sensitivity of X-Ray Examination of Defects 12
Technical Committee Reports on Steel Extras 15
Wire Wheel Manufacture at Chevrolet Plant 16
Welding's Challenge to Steel 21
Attractive Finish Helps Metal Products Sales 23
With Compliments to Mr. Conneery 28
New Equipment 32
News 35
Personals and Obituaries 37
Washington News 38
Automotive Industry 44
Markets 47
Construction and Equipment Buying 64
Products Advertised 92
Index to Advertisers 114

▲▲▲

THE IRON AGE PUBLISHING COMPANY
F. J. FRANK, *President* G. H. GRIFFITHS, *Secretary* C. S. BAUR, *General Advertising Manager*
PUBLICATION OFFICE: N. W. Corner Chestnut and 56th Sts., Philadelphia, Pa.
EXECUTIVE OFFICES: 239 West 39th St., New York, N. Y., U. S. A.

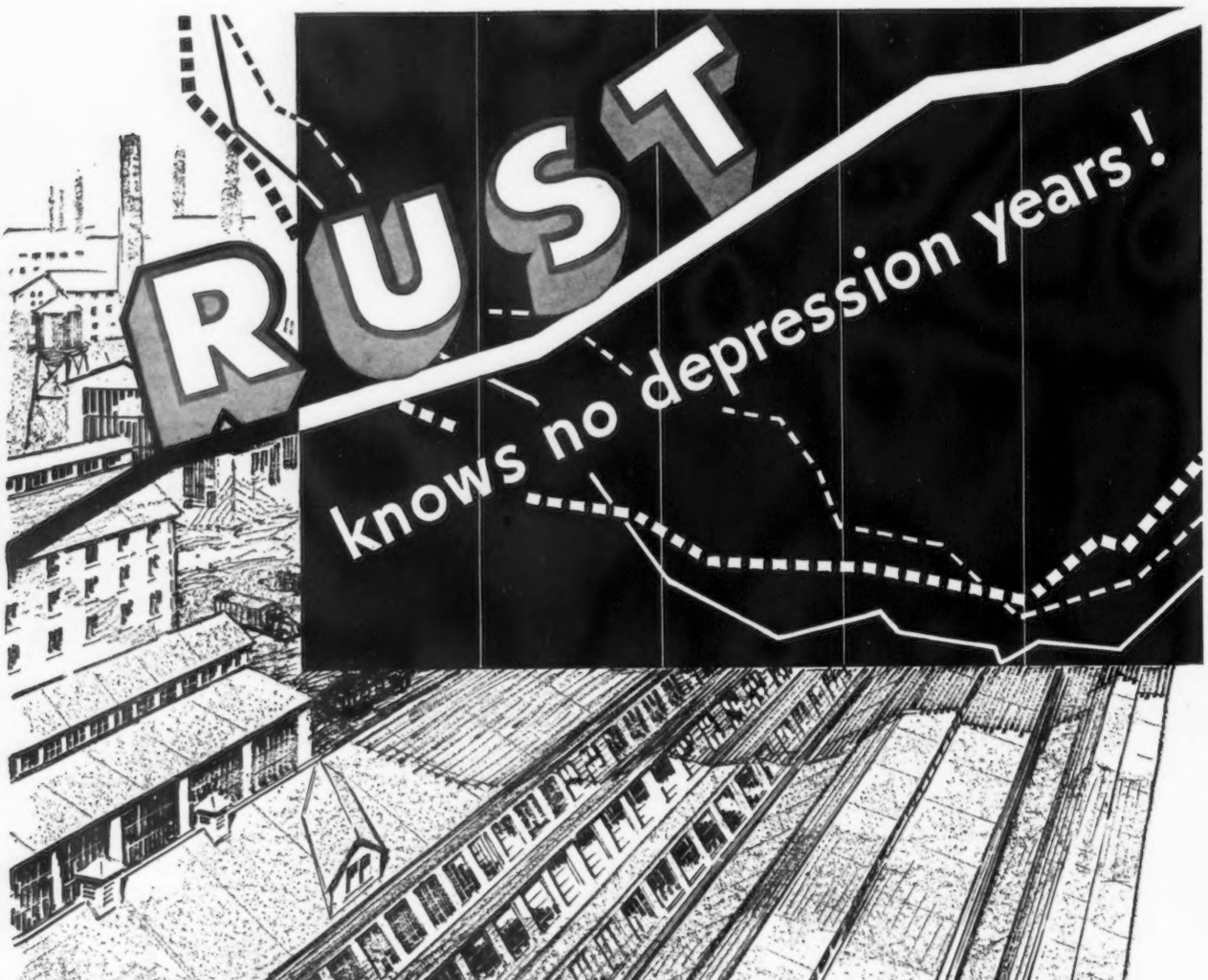
Member, Audit Bureau of Circulations
Member, Associated Business Papers

Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00; Canada, $8.50, including duty; Foreign $12.00 a year. Single Copy 25 Cents

Cable Address, "Ironage, N. Y."

ADVERTISING STAFF
Emerson Findley, 311 Union Bldg., Cleveland
B. L. Herman, 675 Delaware Ave., Buffalo, N. Y.
H. K. Hottenstein, 802 Otis Bldg., Chicago
Peirce Lewis, 7310 Woodward Ave., Detroit
Charles Lundberg, Chilton Bldg., Chestnut & 56th Sts., Philadelphia, Pa.
C. H. Ober, 239 West 39th St., New York
W. B. Robinson, 428 Park Bldg., Pittsburgh
W. C. Sweetser, 239 West 39th St., New York
D. C. Warren, P. O. Box 81, Hartford, Conn.

SEVENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY



BUSINESS CYCLES come and go, but rust goes on forever, continually creating sheet-metal repair jobs which must be carried out, sooner or later.

During the depression years a lot of this work accumulated. Today there are thousands of jobs that can't be put off much longer. Right now, in many industrial plants, new roofing, new ventilators, new ducts and similar items of sheet-metal work are being installed or planned.

When you put in new sheet-metal work around the plant, use sheets that will remain good and serviceable for many years. Use long-lasting, rust-resisting sheets of Beth-Cu-Loy.

You take no chances when you install Beth-Cu-Loy Sheets. Impartial scientific tests have proved that sheets of Beth-Cu-Loy composition (copper-bearing steel) are first among the entire range of commercial steels and irons in resistance to rust; that they outlast ordinary steel sheets by from 2 to 2½ times.

But don't imagine that because they're so durable Beth-Cu-Loy Sheets are expensive. They're not. They cost so little that you can use them on many a job where heretofore you've used ordinary sheets, with a difference in your material costs of only a few cents.

Their combination of proved superior rust-resistance and low cost certainly makes Beth-Cu-Loy Sheets the logical ones to use wherever exposure to rust is involved. Use them in installations around your plant, because they lower upkeep costs. Use them in your products, because they give you, without appreciable increase in your material cost, the potent sales appeal of rust-resistance.

Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL

BETH-CU-LOY SHEETS

▲▲▲ THE IRON AGE ▲▲▲

MAY 24, 1934

ESTABLISHED 1855 Vol. 133, No. 21

Price-Fixing Versus Cost Cutting

THE IRON AGE has not hesitated to condemn the vicious practice of selling below cost. We have likened it to the savage and primitive "dance of death" in which frenzied participants thrust sharp knives into their own bodies.

There is but one economic crime that is more damaging to public welfare than senseless price cutting. It is mandatory price fixing. Selling below cost may be suicidal for those indulging in it, but freezing prices by law means slow starvation of progress for all.

We are glad indeed to observe that the Government now seems to be veering away from the professorial theorem that price control is the principal key to recovery.

There comes a time, due to depression, when prices become too low to permit an existence profit to industry. Take, for example, the experience of the steel industry, which has been operating in "red ink" for a long period. In such circumstances, efforts to raise prices are commendatory and justified. The danger comes in the popular conception that a temporary expedient, such as marking up price tags, can be a panacea to produce a condition of normal permanent prosperity.

OFFICIAL statements of less than a year ago said that we had some 14,000,000 unemployed. Less than two weeks ago, Senator Wagner estimated the present unemployment figure as 11,000,000. Mr. Green, of A. F. of L., has recently put it at 10,000,000.

In the absence of more reliable data, we are safe in saying that the recovery movement, to date, has succeeded in putting some 4,000,000 men to work, at a cost of perhaps $10,000,000,000, or approximately $2,500 per man reemployed.

Evidently the process of creating employment by marking up the price tags hasn't worked out very well, even with billions of dollars to back it.

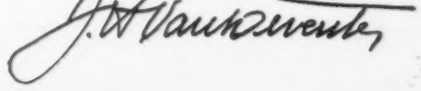
Under these circumstances we think it is in order to respectfully suggest trial of the opposite approach to this problem.

We suggest that administrative emphasis, instead of being placed upon raising prices, be placed upon lowering costs.

After all, the way to stretch the buying power of the average man's income is not to mark up the prices of what he buys but to reduce them so that he may buy more things. That is the only logical way, as we see it, to start more wheels going and put more men to work.

PRICE reductions based upon cost reductions secured through the use of better machinery, methods or materials have formed the keynote of America's past successful industrial philosophy.

In our return to this fundamental philosophy lies the one hope of the depressed capital goods industries and of permanent recovery.



Sensitivity of X-Ray Examination

THIS article records the first major attempt under laboratory conditions to transform the usual qualitative method of X-ray examination into a quantitative procedure. Data are included which indicate the magnitude of "hair-line" cracks, inclusions, etc., that may appear on an X-ray negative prepared for any particular metal thickness. The importance of the angle of incidence of the X-rays is stressed, and the results clearly indicate what type and size of crack can be detected for any particular angle and for any thickness up to 1 in. of steel. The use of the graphs shown in Fig. 5 will enable casting inspectors to estimate the size of the smallest imperfections which they may expect X-ray inspection methods to reveal under ideal laboratory conditions.

▼ ▼ ▼

USING a 200,000-volt Coolidge tube, the examination of metallic sections is limited to thicknesses equivalent to 2 to 3 in. of steel. Since it is of great importance to know how small an internal defect can be detected by an X-ray examination, a series of experiments were performed to obtain quantitative information on the capacity of X-ray methods to reveal such defects. The experimental work also included sensitivity measurements on "hair-line" cracks and thin metal sections.

The sensitivity of a radiographic examination depends to a large extent upon the thickness of the section. This might reasonably be expected when it is considered that with increased thickness the problems introduced by absorption and the internal scattering of the X-rays are intensified. The orientation of the defects in the object to the incident rays also is of considerable importance. For example, if a casting contains a crack which is oriented at 90 deg. to the incident X-rays, the width of the crack represents the difference in density which the rays must indicate, whereas if the crack were a vertical one, parallel to the direction of the X-ray radiation, the entire length of it would furnish a path of reduced absorption for the X-rays. Therefore, cracks lying at angles to the path of the radiation tend to give diffused rather than clear cut images.

This is clearly illustrated in Fig. 1, which shows why such results are unavoidable, and adds emphasis to the importance of making several examinations at different angles when small cracks are suspected to exist in the subject under examination. The same view shows the importance of using rays coming from a source as nearly approximating a point as possible. Two controls are used to obtain this approximation of a point source. In the tube itself, a molybdenum shield placed around the cathode directs the flow of electrons to a focal spot approximately ¼ in. in diameter on the target. The size of this focal spot is fixed when the X-ray tube is manufactured and cannot be changed by the operator using the tube for X-ray examinations. The second method is to vary the distance between the tube and the metal being radiographed, and this control is easily applied by the operator of the X-ray tube. The further the tube is removed from the object the more closely it approaches a point source, and the sharpness of the X-ray photograph is increased in proportion. The increase of exposure time, however, is a limiting factor in increasing the distance of the tube from the object. Satisfactory definition can usually be obtained with a tube-to-film distance of 24 to 36 in.

A series of tests were made by using artificial cracks of a cross-sectional area of 0.0005 sq. in. in a steel plate 1 in. thick. The cracks were varied in

▲ ▲ ▲

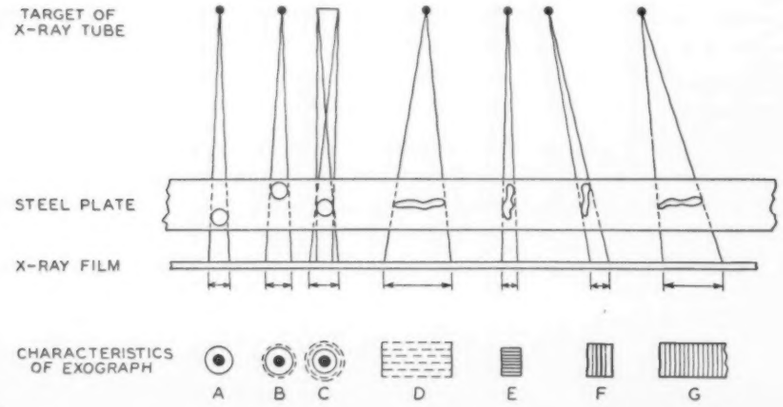


FIG. 1—Illustrating the extreme importance of a point source and angle of incidence of X-rays in order to procure good definition of internal imperfections. A—Point source with cavity near X-ray plate; exograph has dark center and is light at edge; definition is sharp. B—Point source and cavity near the top of steel plate; exograph has dark center, but edge is light and somewhat diffused. C—Large X-ray source; exograph dark at center, but edge is very light and diffused. D—Horizontal crack; exograph has light uniform shading. E—Defect vertically situated; exograph has uniform dark shading. F—Angle of incidence about 30 deg.; exograph is larger and has light shading at edges with darker center. G—Horizontal crack with ray incidence about 30 deg.; exograph is larger, and shading is light and almost uniform.

# of Metal Defects

By LESTER E. ABBOTT
Technical Staff, Bell Telephone Laboratories,
and T. W. Lippert, The Iron Age

depth and width in order to determine the effect of these variables on the readability of the X-ray negative. In addition, the cracks were X-rayed at orientations which varied from a normal position to a position where the X-ray radiation was at an angle of 15. deg. to the plane of the crack. Results are shown in Fig. 2. Cracks having the larger ratio of depth to width were more easily distinguished when they were directly in the path of the radiation or when lying at angles less than 3 deg. to the radiation.

When the cracks were oriented at angles between 3 and 15 deg. to the radiation, those with the smaller ratio of depth to width were more easily detected. For example, in Fig. 2, the crack 0.0625 in. deep and 0.008 in. wide can be distinguished at a 15-deg. angle, whereas the crack 0.25 in. deep and 0.002 in. wide is practically invisible.

Considerable work was performed on so-called "hair-line" cracks—or cracks of smaller area than 0.0005 sq. in. The equivalent of this type of artificial crack is often found in castings and forgings, and, generally, this type of imperfection is the most elusive defect with which the radiologist has to contend.

It was found that the limiting cross-sectional area of a crack which could be distinguished on a ½-in. steel plate under the best radiographic conditions was 0.000035 sq. in., representing a crack with a depth of 0.007 in. and a width of 0.005 in. The results are shown in Fig. 3.

Because of the importance of the

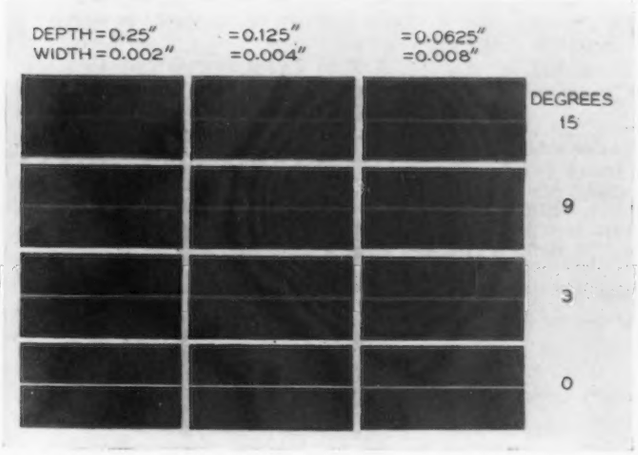


FIG. 2—Exographs of artificial "hair-line" cracks of 0.0005 sq. in. cross-sectional area in a 1-in steel plate. The angle of incidence of the X-rays varies from 0 deg. to 15 deg. All cracks are visible at 0 to 9 deg., but the narrow deep crack (upper left) fades out at an angle of 15 deg.

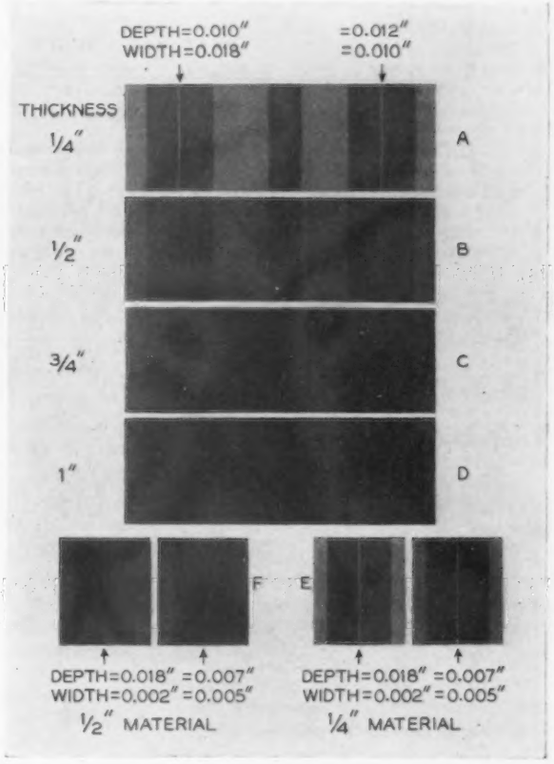


FIG. 3—Exographs of artificial "hair-line" cracks. The steel plates A, B, C, and D vary in thickness from ¼ in. to 1 in. Two cracks with measurements common to all four plates are easily distinguishable in A and B, but only the right-hand crack is visible in C; neither can be detected in D. Exographs E and F show cracks of 0.000035 sq. in. cross-section; they can be detected in the ¼-in. material, but are barely distinguishable in the ½-in. material.

FIG. 4—Exograph of the modified penetrometer showing steel gage blocks arranged in steps of constantly increasing thicknesses on a ½-in. steel plate. To the left, the last gage block definitely visible is 0.003 in. thick. For a ½-in. steel plate, therefore, the optimum X-ray exposure conditions will detect extra thickness of 0.6 per cent of the total plate thickness.

orientation of these very fine shrinkage cracks upon their detection by X-ray methods, it is sometimes desirable and often imperative to take two or more radiographs at different angles. This method is used in order that the defects presenting too small a difference in thickness for detection on one of them may be detected on the second picture where the path of the radiation through the defect may coincide more nearly with its longitudinal axis.

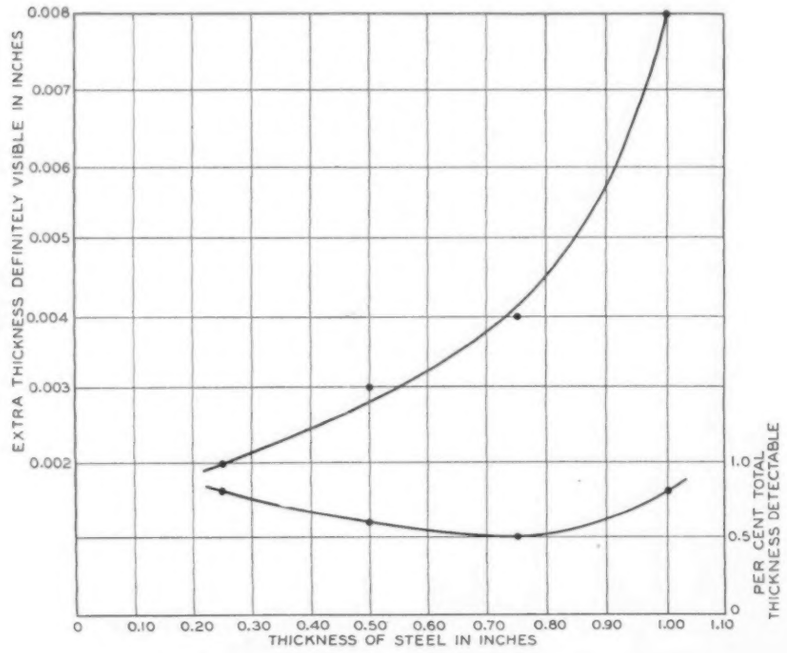


FIG. 5—Plotted results of the sensitivity measurements. The upper curve shows the *additional* thicknesses of steel perceptible for various total thicknesses of steel penetrated by the X-rays. The tube voltage was regulated to give optimum exposure conditions for each thickness of metal as previously determined (see Table I). The lower curve gives the percentage of total thickness detectable in the exograph for any steel plate up to 1 in. thick.

Results of Penetrometer Experiments

In Fig. 4 there is shown an X-ray picture prepared by use of a modified penetrometer. This was used in studying the sensitivity of an X-ray examination in discerning the various types and sizes of internal defects in steel. Upon a steel plate—say ½ in. thick—there are placed a number of steel gage blocks. The blocks are arranged side by side, and each successive block is thicker than the preceding one by a definite measureable amount. The resulting radiograph shows a series of bands of different intensity varying in steps corresponding to the thickness variations of the gage blocks. By picking out the first band perceptible, and knowing the thickness of the gage block corresponding to the band, a quantitative value is found for the minimum additional steel thickness which is detectable in a ½-in. steel plate. The same procedure is repeated but using additional plate thicknesses varying from ¼ in. to 1 in. At all times the voltage of the tube is regulated so as to give the optimum exposure conditions for each particular thickness of steel. These exposure conditions which were determined in a preceding experiment are given in Table I.

Within a known thickness range, therefore, the effective thickness of any defect, which is represented by a darker area on the negative, may be estimated. This is accomplished by knowing the total thickness of the material, and the ratio between the photographic density of the film where the defect is shown and the density at a point where no defects appear. Interpretation of most X-ray negatives is, therefore, resolved into a quantitative instead of a qualitative study, and the procuring of accurate knowledge of internal imperfections is greatly facilitated by the use of graphs prepared from such data.

TABLE I

Metal Thickness Examined in In.	Distance from Tube to Film in In.	Kilovolts	Milliamperes	Exposure Time in Min.
¼	24	120	5	3
½	24	140	5	5
¾	24	160	5	8
1	24	170	5	10

Investigation demonstrated that in a thickness of ½ in. of steel, differences in thickness, parallel to the path of the X-ray radiation, representing 0.5 per cent of the total thickness may be detected. For one inch of steel thickness, the sensitivity of the X-ray method is in the neighborhood of 0.8 to 1 per cent of the thickness, and for 2 to 3 in. sections defects representing a difference of 2 per cent in thickness may be readily detected.

The plotted results of the experimental data are reproduced in Fig. 5. The upper curve shows the minimum thicknesses of steel detectable for various total thicknesses of steel penetrated by the rays. The lower curve shows the same data in a different form. The per cent of total steel thickness detectable is plotted against the total steel thickness. If an X-ray photograph of a casting or metal joint has an even density, it can then be estimated that any defects which are included but not detected are less than the minimum established by the data shown by the curve in Fig. 5.

X-Rays and Gamma-Rays Compared

Even the larger X-ray machines do not give satisfactory photographs of steel thicknesses in excess of 3 in. But, by the use of Radon, sections 10 in. thick may be inspected and, naturally, the gamma-ray method should begin where the X-ray method ends. It has often been stated that, because of the very short wave-lengths of the gamma-rays, the contrast in the resulting radiograph is less than when X-rays are used, and that this lack of contrast lessens the ability of the method to show up the smallest defects in the object examined.

This question of comparative definition of X-rays and gamma-rays is still somewhat controversial. Dr. Lester at the Watertown Arsenal has done considerable work experimenting in the field of X-raying analysis. In commenting on the results obtained by Dr. Lester, Lieut. Linkè, of the Naval Gun Factory, stated that for thicknesses up to 4 in. the X-rays gave better definition and the pictures were more easily read than in the case of gamma-rays. The Naval Gun Factory is expecting an improved X-ray unit by the middle of June, and, as soon thereafter as practical, Lieut. Linkè expects to collect interesting data on the comparison of X-rays with gamma-rays.

(Concluded on Page 72)

Technical Committee Reports on Steel Extras

By L. S. MARSH
Manager, Department of Inspection and Metallurgy, Inland Steel Co., Chicago

THE Technical Committee of the American Iron and Steel Institute was appointed by the board of directors on Dec. 14, 1933, and, at an organization meeting held in Pittsburgh in January, a permanent chairman was selected, the work outlined and 12 sub-committees appointed.

In considering the work of the committee, it was apparent that the most pressing subject would be a thorough study of the various sections of the book of "Uniform Extras and Deductions for Products of the Iron and Steel Industry under the Code of Fair Competition." This study was considered necessary to correct errors, change the phraseology where the intent might not be clearly understood, and make such additions as seemed necessary for a clearer understanding of the details, particularly with reference to qualities, grades and specifications.

Committee Drawn from A.A.S.M.T.C.

Each of the 12 sub-committees mentioned acts as an informative group in conection with specific product classifications, e.g., Semi-finished; Bars, Plates, Tubular Products, etc. In nearly every case, the chairmen of these sub-committees are also chairmen of permanent committees handling similar products in the Association of American Steel Manufacturers' Technical Committees, from which organization, the personnel of the Technical Committee was drawn. It seems proper and desirable at this point to give a brief history of the inception and activities of that association.

Nearly 40 years ago at a meeting in Atlantic City, the Association of American Steel Manufacturers was organized. The resolution which served to form this group, as taken from the records, reads as follows: "Resolved, that a permanent organization be hereby formed to meet from time to time to discuss matters pertaining to the manufacture and use of steel." Certainly a broad field to cover but, as events proved, none too broad for the purposes of the organization thus begun.

The resolution plainly states the foundation on which all of the association activities have been based. These activities have been, and still are, representative of much pioneer work in the standardization of metallurgical and technical practices em-

▲ ▲ ▲

THE following report is being presented today before the American Iron and Steel Institute at the Commodore Hotel, New York, by Mr. Marsh, chairman of the Technical Committee.

▼ ▼ ▼

ployed in the manufacture, rolling and finishing of general commercial steel products in this country.

One of the first jobs undertaken by the new organization was the standardization of specifications for structural and open-hearth plate steel which included the first standard rolling tolerances for plates. The value of this pioneer work is evidenced by the fact that these tolerances, revised to provide for improvements in manufacture, have remained to the present time generally acceptable to both buyer and manufacturer.

The Association of American Steel Manufacturers developed the first standard sections for beams, channels and angles known as "American Standard Sections" which were uniformly adopted by the American mills.

Other activities of the association may be briefly mentioned, as follows:

Standardization of tests for eye-bar flats based on tests of material rather than on full-sized eye bars.

Agreement that the tensile strength stamped on boiler plates should be the guaranteed minimum.

The adoption in 1903 of a single grade of structural steel, with a tensile range of 55,000 to 65,000 lb., instead of two grades with tensile ranges of 52,000 to 62,000 lb., and 60,000 to 70,000 lb. This is representative of a type of standardization which is extremely valuable to both user and manufacturer. In this connection mention should also be made of the cooperation of the association with the American Society for Testing Materials, during the past two years, in developing specifications for a "Medium-Grade Structural Steel" with a tensile range of 60,000 to 72,000 lb. per square inch. It is expected that this new grade will gradually replace the present standard specification material.

Adoption of standard permissible variations in the weight of bar-size angles.

Adoption of standard permissible variations in the size of hot-rolled rounds, squares, hexagons and flats.

Standard specifications for concrete reinforcement bars.

Standard specifications for open-hearth steel blooms, billets and slabs for forging purposes. Standard methods of sampling for check analysis.

Development of the standard specifications for boiler and firebox steel.

Cooperation with the A.S.M.E. Boiler Code Committee, resulting in the adoption of specifications conforming to standard practice.

Adoption, in 1917, of a grade of steel known as "pressing steel."

During the past two years the association has published tables for cutting and rolling tolerances for bars, tables of permissible variations for gage, flatness, camber, width and length for plates over 2 in. in thickness, and has been largely instrumental in developing standard specifi-

(Continued on Page 68)

Chevrolet Uses Special

IN the manufacture of wire wheels for its passenger cars, the Chevrolet Motor Co. employs unusual stamping methods through variation in the design of standard presses and through specially constructed dies. Ingenious arrangement of machinery and of conveying equipment makes possible large production in a small floor space. The accompanying article describes the fabrication of the steel rims, the inner shell and the hub shell and outlines the assembly operations.

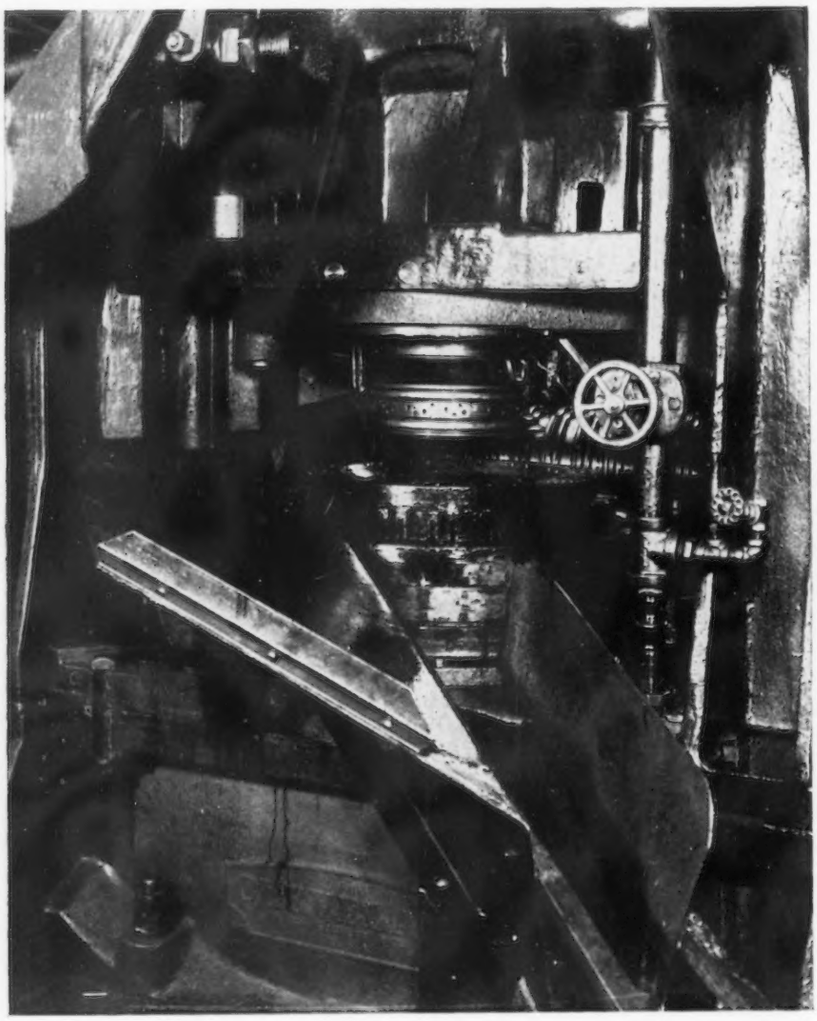
FOR the past three years the Chevrolet Motor Co. has been making wire wheels for its "Master Model" at its Detroit manufacturing plant. Six hundred wheels an hour are built in a comparatively small floor space by means of ingenious arrangement of machinery and novel use of conveying equipment. Economical production is made possible by employment of modern machine tools. Unusual stamping operations are achieved through variations in the design of standard presses and through dies of special construction.

Steel rim stock 5⅛ in. wide, 56½ in. long and 0.156 in. thick comes into the plant in bundles and is carried to the first operation on an electric lift truck. After being cut to length, the rim is coiled in a standard coiling roll to which is attached a device for automatically ejecting the rim when the coiling process is completed. The rim then is welded together on a flash welding machine and the flash trimmed off in a single-geared press with a long stroke in which the rim is held in position by a special fixture. That is, the rim is clamped in the press at the same time that the flash is sheared, the clamping and trimming being accomplished with a single stroke of the press.

Three rim forming operations follow on rim rolling machines possessing special form rolls and controlled by hydraulic pressure. Here the drop center of the rim is completed, tire seats are flattened and both edges of the rim are curled. The rim stock is guided into the first machine on a special spool which holds it on center. Rims pass through these machines at the rate of 400 an hour.

Rims are tested for equalization of expansion on an expanding machine and then are tested for contraction of the steel on a machine of the same type. After this rigid test, rims are inspected by hand for the diameter of the tire seats and for cracks and are closely scrutinized with respect to other factors.

One of the most interesting operations in the entire wheel-making process is the piercing and countersinking of 48 spoke holes simultaneously in a straight-side, double-crank press with a twin drive and 18-in. stroke. A special die containing 48 punches is used. At the end of the press stroke, automatically-operated metal fingers pick the rim out of the die and the operator pushes it onto a gravity conveyor along which it rolls in a vertical position. After the valve stem hole is pierced in a geared single-action press, the rim moves again on a gravity conveyor to the assembly station.



A SPECIAL die containing 48 punches is used in piercing and countersinking 48 spoke holes simultaneously in a straight-side, double-crank press. At the end of the press stroke, automatically-operated metal fingers pick the rim out of the die and the operator pushes it onto a gravity conveyor.

Making the Inner Shell

The inner shell, otherwise known as the hub shell bolt flange, is fabricated in five operations as follows: blank and draw, second form, pierce oil drain hole, close in or redraw, and

Equipment To Make Wire Wheels

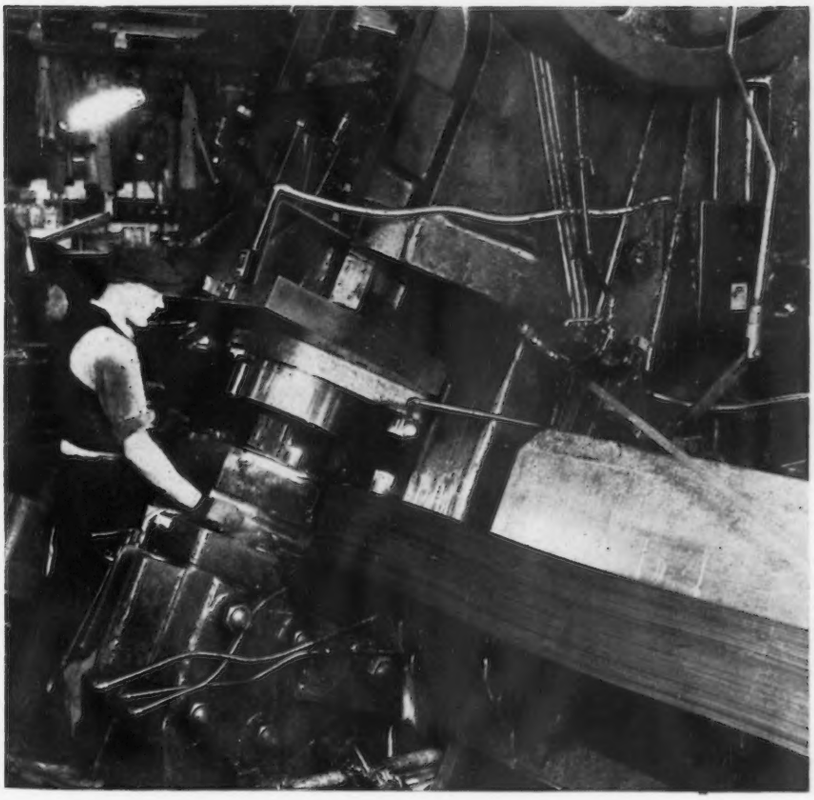
pierce and countersink the bolt holes. Three of these presses are installed on permanent inclined legs so that at the end of each stroke the work will fall out of the die into proper receptacles, thereby saving the operator's time and speeding up production. Two of the machines, the one for blanking and drawing and the other for the second forming, are equipped with air cushions to hold the pressure plates. The inclined presses have a special stroke and die space to accommodate the tools and to facilitate the movement of operators. The inner shell is made from hot-rolled strip steel 0.130 in. thick and 12⅝ in. wide.

In the formation of the outer or hub shell many of the presses used are of the single crank, open back gap frame type with special dimensions and specifications to meet Chevrolet's requirements. The steel for this part is 0.110 in. thick and 18⅝ in. wide. The first operation of blanking and drawing is performed in a double-geared, twin-drive punch press equipped with a special device for lubricating the steel and pushing it into the hands of the operator. This device works off the crankshaft of the press by means of a lever and arm. The arm takes hold of the far end of the top sheet in a pile of steel sheets and moves it into a convenient position for the operator to insert it in the die. At every revolution of the press a specified volume of compound is sprayed on the sheet through a pipe with a funnel-shaped end.

▲▲▲

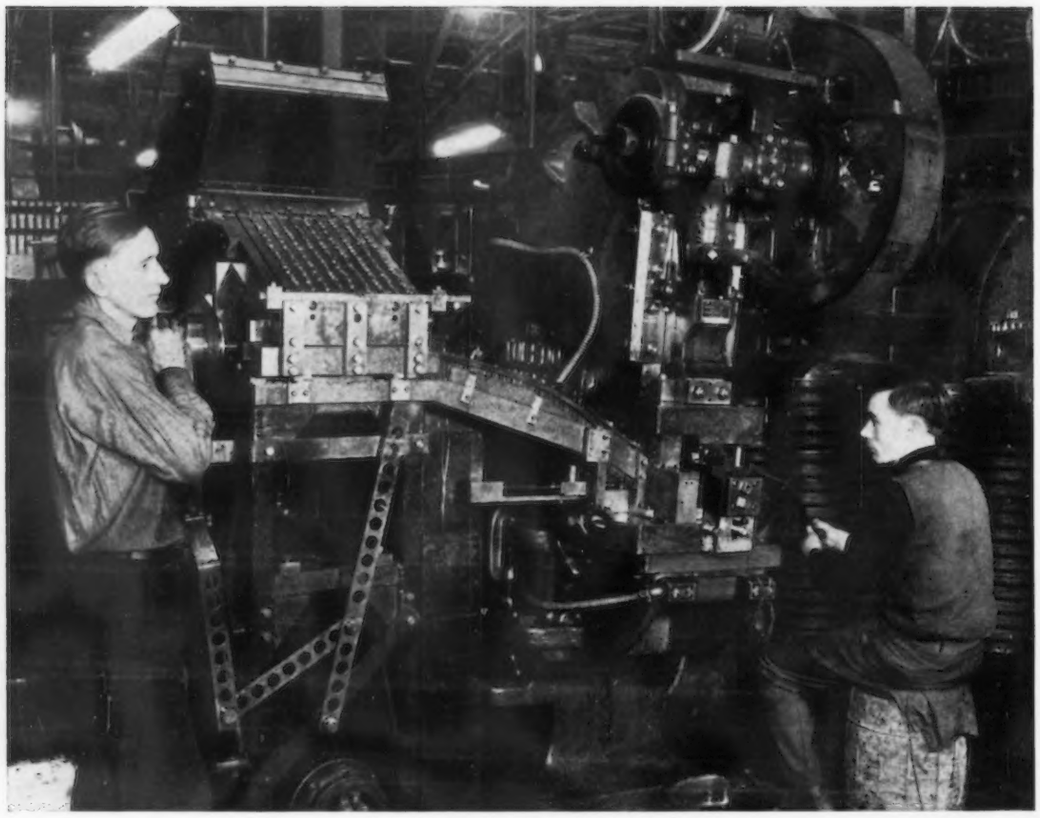
THE hub shell is trimmed and bulged in one stroke of a single-geared press equipped with a specially constructed die.

A DOUBLE-geared punch press (Below) is equipped with a special device for lubricating the steel and pushing it into the operator's hands. The device works off the crankshaft of the press by means of a lever and arm. At every press revolution, a specified volume of compound is sprayed onto the sheet through a pipe with a funnel-shaped end.

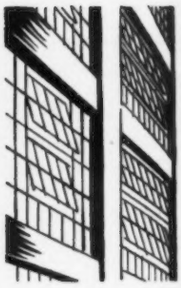


This mechanical feeding of material and the lubricating process relieve the operator of doing the work by hand and contribute to greatly increased output. The press is controlled by an air valve, thus making it unnecessary for the operator to pull the large clutch in and out by hand. When the material leaves this press it resembles in shape a trench helmet.

The second forming is done on a straight side, double-geared, single crank press with a twin drive and 20-in. stroke. During this operation a serration is made on the inside of the shell which holds the inner shell in place when assembled. After the



SIX thousand spokes an hour are bent in this press which is fed automatically from the hopper at the left. The hopper is V-slotted so that the small end of the spokes are hanging down and heads always are up.



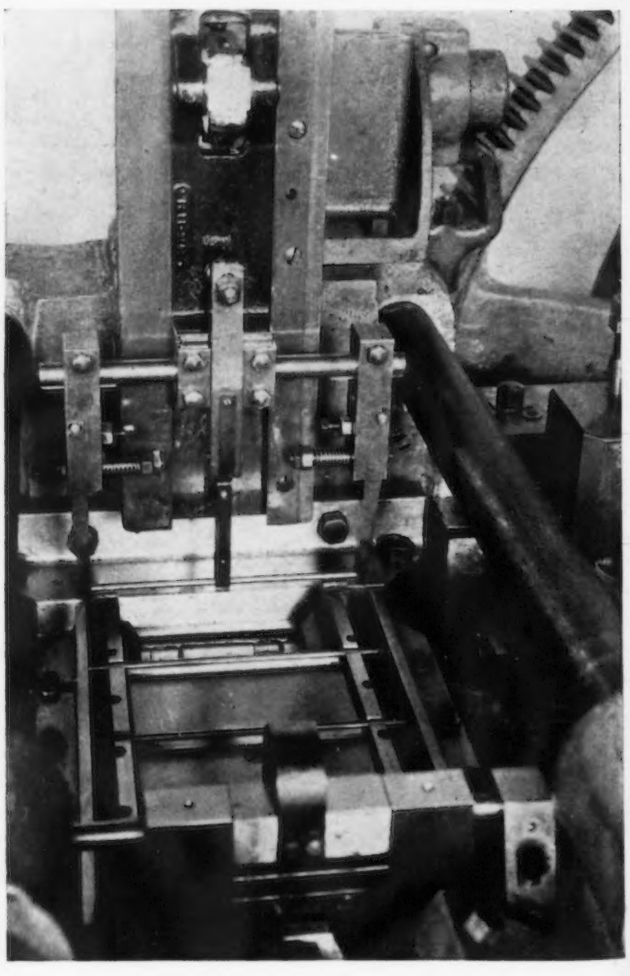
center hole in the bottom of the shell is pierced, the shell is trimmed and bulged in one stroke of a single-geared press with a specially constructed die. The piercing and countersinking of 24 short spoke holes in the large end of the shell follows. The holes are countersunk on the inside of the flange with the proper angle to conform to the shape of the spoke head.

Formation of depressions in the small end of the shell is one of the more difficult operations in making Chevrolet wheels. These depressions are made so as to permit the clearance for the long spokes to be at the proper angle when assembled in the wheel. At the same time the shoulders for spoke heads to rest on are formed. These actually are part of the depressions. Twenty-four short spoke holes then are pierced and countersunk in the small end of the shell.

Completing Hub Assembly

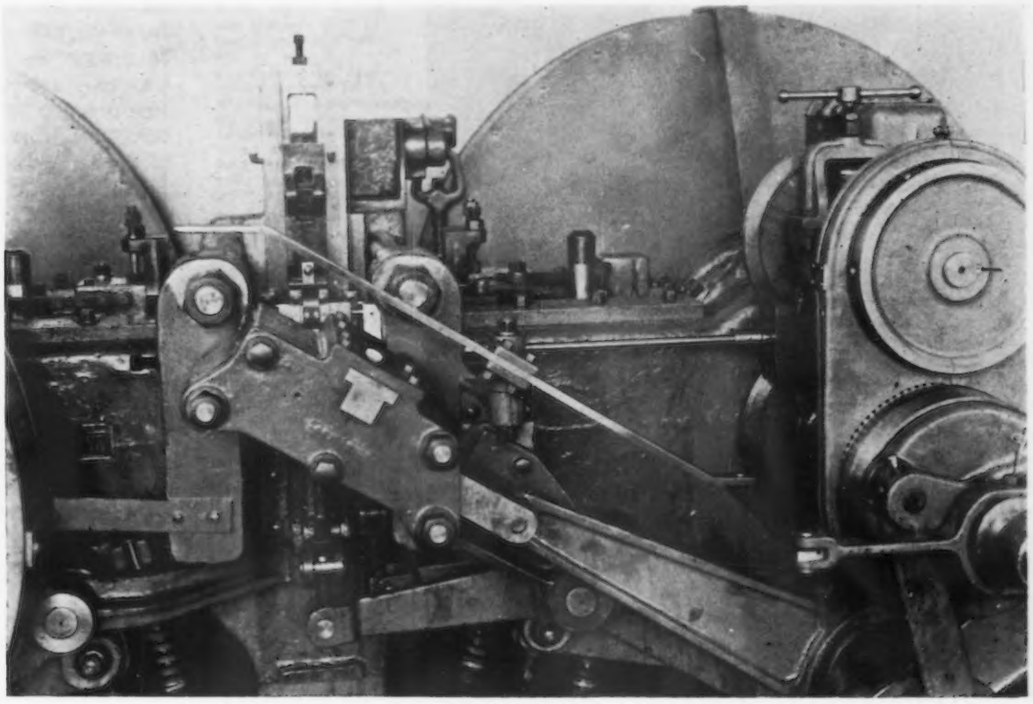
The outer and inner shells are pressed together and riveted, thereby completing the hub shell assembly. This work begins in a press with a special die which moves against an air cushion holding the inner shell the proper distance from the face of the outer shell while eight rivet holes are pierced. The operator takes the work out of the press and inserts the rivets into the holes. The shell

IN the machine for cutting and heading spokes at both ends, blanks are carried by the conveyor and transfer devices over and down to the dies.



then passes on a gravity conveyor to an assembly press where all eight rivets are pressed in position and riveted. The shell assembly moves from this operation on an overhead conveyor to the final assembly line.

Wire spokes are cut and headed at both ends on an open die double end spoke heading machine employing many of the standard features of an open die double stroke machine for making bolt, screw and rivet blanks. It is of duplex construction, having two crank-actuated heading units which operate simultaneously and produce both upsets with each cycle.



WIRE spokes are cut and headed at both ends on an open die double end spoke heading machine. Wire is fed from a reel through a roll straightener attached to the machine and thence through a guide quill against a wire stop, where it is cut off.

Each heading unit is made with a wedge adjustment device and carries a vertically reciprocating punch slide and spring compensator device. There are two pairs of heading dies so that the wire blanks can be gripped at each end. These dies are located between the two heading units at the center of the machine.

Conveyor of Ingenious Design Used

The wire is fed from a reel through a roll straightener attached to the machine and thence through a guide quill against a wire stop where it is cut off. The cut-off is of the solid die header type with cut-off bar and knife. After the wire blank has been sheared, it is deposited in a conveyor of ingenious design and transferred to the center of the machine, being engaged there at each end by a finger. The two fingers are attached to a vertical transfer slide which carries the blank down to the heading line, where it is held by the fingers between the open dies.

Dies are closed to grip the blank by a toggle mechanism. The vertical transfer slide ascends, leaving the blank gripped tightly in the dies ready to be headed. During the upward movement of the transfer slide, both gates advance, upset the cones, recede and shift, advance again, deliver the finishing blows and finally recede, thus completing the cycle.

Wire about ¼ in. in diameter is fed into the machine from coils weighing 125 to 175 lb. each. Spokes, made in one operation, are held to close limits for length, diameters of the upset ends, diameter and thickness of the spoke heads and angles of the spokes. The machine produces approximately 3000 spokes an hour. It is notable that the precision with which these spokes are made insures a true wheel and gives the same tension on each spoke in service.

As the spokes emerge from the double heading machine, they are inspected with hand gages, some of which have micrometer adjustments.

Assembling Spokes

Spokes are dumped into a large hopper, the bottom of which is V-slotted so that the small end of the spokes are hanging down and the heads are always up. These V-slots lead into a narrow chute down which the spokes move by gravity to presses equipped with special dies which hold the spokes in position in relation to the angle of the head and bend the bottom end of the spokes to the proper angle. Three spokes are bent at each stroke of the press. After each stroke, three bent spokes are removed from the press by an operator who puts them on an overhead conveyor. The entire cycle of the press, including the feeding, is automatic. One man who has charge of the double heading machine keeps the hopper filled with spokes. Production of this press is 6000 spokes an hour.

The rim, the shell and the short spokes are assembled by the insertion of 24 short spokes in the holes on the large end of the inner shell. As a portable expander is held in place, the other end of the spokes is placed in the rim, holding the rim. The wheel then is put in a large press with a special die which moves both up and down against a hydraulic cushion. This die not only pushes the spokes into the right position, but also holds them while they are riveted 24 at a time.

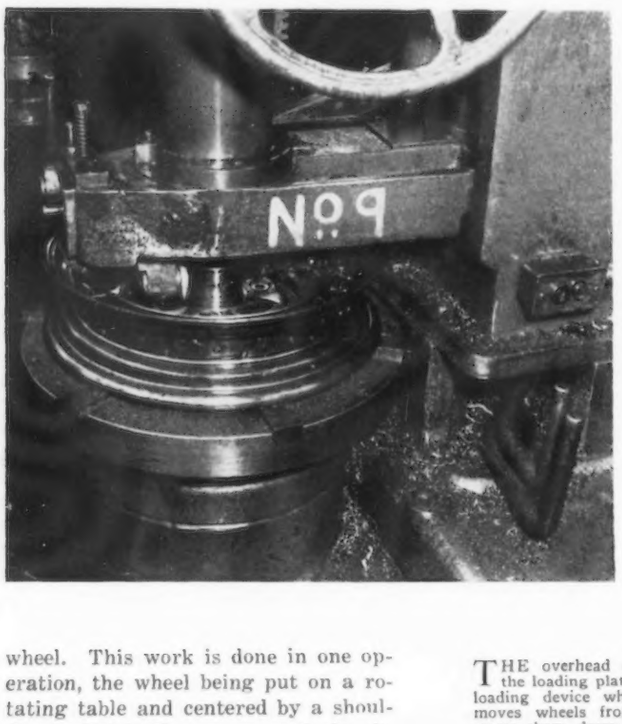
After the riveting operation, the spoke expander is removed and the wheel placed on a gravity conveyor in an upright position, rolling to a station where the long spokes are assembled by much the same method as the small spokes. The long spokes are held in position for the riveting process by a special expander with a self-

locking taper which remains in place when inserted in a wheel.

Wheels move from the spoke assembly station along a gravity conveyor to a special semi-automatic machine for boring and turning the outside diameter of the wheel and the hub cap end and facing the hub side of the wheel. This work is done in one operation, the wheel being put on a rotating table and centered by a shouldered pilot in the upper vertical unit. This unit is fed downward by means of a rapid traverse through a manually operated hand wheel to an indicated stop and locked in that position. The pilot is mounted on ball bearings and is backed by a heavy spring so that the necessary pressure can be exerted to hold the wheel in place during the forming operations. The stop consists of a roller which rides on the hub of the wheel proper and enables the operator to set the cross slide to remove the minimum amount of stock for truing the hub.

With the upper vertical unit in this position, the feed is thrown in by a hand lever in the center of the machine. The cross slide then finishes the hub face and forms the radius on the periphery of the hub flange. Simultaneously with this operation, the lower vertical unit is automatically fed up, boring the opposite end of the hub with a circular form tool. The unit continues to travel upward until the boring is finished, at which time a roller comes in contact with the lower face of the hub. This roller follows the lower face of the hub and keeps the turning tool, which is automatically fed horizontally at this point, true with the lower face of the hub, insuring a symmetrical chamfer.

When the turning work is completed, the lower unit comes to rest at the downward end of the stroke and the upper unit is released and fed upward to the end of its stroke. The operator then removes the finished wheel from the machine. The machine is equipped with ball bearings and is driven by an electric motor in the base. The table which rotates the steel wheel is driven by a spiral bevel gear. Production is 65 to 70 wheels an hour.



THE outside diameter of the wheel and hub cap end are bored and turned and the hub side of the wheel is faced on a special semi-automatic machine. The work is done in a single operation, the wheel being put on a rotating table and centered by a shouldered pilot in the upper vertical unit.

Final Inspection Rigid

From this machine, the finished wheel is rolled to an inspection bench where it is put through a rigid final inspection, including the testing of each spoke for tension. Wheels are hung by the inspector on special hooks on an overhead conveyor to be taken to railroad cars for shipment to branch assembly plants. On the way they are submerged in a special rust-proofing compound to protect them from corrosion. From the tank to the outer wall of the plant a drain board is built underneath the conveyor.

On the loading platform outside the plant the overhead conveyor runs past an unloading device which automatically removes wheels from the conveyor and starts them down a slide in a vertical position to railroad box cars. Extra sections of the slide have been built so that wheels can be rolled without effort from one freight car to another or from one end of a car to the other end. Loading expense is minimized and the loading process hastened in this manner.

THE overhead conveyor (Below) on the loading platform runs past an unloading device which automatically removes wheels from the conveyor and starts them down a slide in a vertical position to railroad box cars.

Welding's Challenge to Steel

By EVERETT CHAPMAN

Vice-President, Lukenweld, Inc., Division of Lukens Steel Co., Coatesville, Pa.

IN traveling around the country in the interest of welded steel construction, two major impressions are outstanding. First, the woeful lack of knowledge of steel on the part of the average user, and, second, his tremendous curiosity concerning the nature of steel. His capacity for absorption of all the fascinating technical details—causes of laminations, ingot structure, influence of open-hearth charge, rolling operations, mechanism of flame-cutting—is unrealized. He is a tonnage consumer of potatoes, steel, coal, cotton, sugar and other commodities; with a latent desire to discuss any fascinating subject, particularly if he can become more familiar with the vagaries of the materials with which he must live.

This consumer emptiness is hardly assuaged by knowledge of the base price of steel, while the additional information regarding the extras is of no help at all. Is it any wonder that his sources of steel or, for that matter, steel itself, are more or less hazy, impersonal things that he accepts as a matter of course? Steel to him is an old drudge, a somewhat dependable old hag who has her price and a modicum of temperament.

Elevate Steel from Commodity Class

Yet in steel he has a material possessing a set of physical characteristics unmatched by those of any other material — characteristics that can be flexed and molded to meet the most stringent conditions. Does he want the stiffest material that is commercially available? Does he need unsurpassed strength at some point? Does he need a material that he can repeatedly beat upon, something that he can abuse? Does he wish it to absorb energy? The answer of the steel industry to date has been largely: "Just get some rolled steel."

But the answer has not been sufficient to elevate steel from the commodity class in the consumer's mind, for the simple reason that the consumer has not been taught the manipulation of the properties of steel which results in the superb performance of which steel is capable under the severe demands of present-day industrial duty. The consumer does not realize that rolled steel, despite its low base price of less than 2c a lb., offers him the very properties that he so often seeks in materials at far higher price. The glamorous romance of steel that could have such an appeal to the consumer has been dimmed and buried by two facts, its price and the apparent unwillingness of the steel industry to talk very much about anything else except price.

Steel Consumer His Own Teacher

The consumer has had to be his own teacher and what he knows of the use and abuse of steel has been learned principally in the hard school of experience in the grim shadows of tradition. In applying welded steel construction to the consumer's real needs, it has been found necessary to discuss such fundamentals as modulus of elasticity and deflection phenomena; fatigue characteristics, endurance limits and the mechanism of fatigue failures; carbon content and general chemical analysis as they affect the thermal abuse administered to steel when welding or flame-cutting it; and impurities and the segregation of impurities as they affect the weldability of steel. Also, open-hearth chemistry and the structure of open and killed ingots as they respectively affect the soundness of the resulting rolled product; rolling operations; heat treatment and stress relief of resulting structures; contraction phenomena of the weld metal and its relation to locked-up stresses; the effect of locked-up stresses upon the subsequent service behavior; and a multitude of other technical details and ramifications, all of which the consumer finds utterly fascinating and which are vital to his intelligent use and engineering appreciation of rolled steel.

Welded Construction Offers Steel Promotion Opportunities

Those things that one knows and understands are first in his esteem. It would seem that the picture that welded steel can present to industry is the perfect medium for the dissemination of the information the steel consumer needs and desires. And the picture is broad. It is pretty well established in the minds of some few people at least that the limit of the possibilities of the welding method of construction is only that imposed by the engineer's imagination. Properly used, the process allows an engineer the freedom to function as an engineer, since the inhibitory restrictions of the old established practices are absent. It constitutes a tremendous challenge to the engineering profession in that it presents a perfect tool with which to integrate an assembly of steel units into a whole. Its magnificent potential appeal to the most fertile field for steel's promotional work is the implied challenge to the steel industry.

Judging by the content of many interviews and interest at the various meetings around the country, users and potential users of steel are voracious for information on steel for welding, welding methods, and welding design. To date, everyone interested in the welding process has participated in this development, but

Paper presented at the meeting of the American Iron and Steel Institute, held May 24, at the Hotel Commodore, New York.

there has been no organized participation by the steel industry, which can probably gain more through the advancement of welding than any other group, not merely in direct tonnage gains but in an opportunity to present steel as an entity, with a personality, on a stage which can be set for it with its own properties, in strict conformity with the most modern methods of marketing.

Physical Properties of Weld Metal Also Challenging to Mills

Aside from the marketing angle, the welding development carries another challenge to the steel mills. Modern weld metal is a freak metal. It is freakish in that similar physical characteristics cannot be produced in the open hearth today. Compared with open-hearth steel of the same chemical analysis, it shows markedly superior physical characteristics. At a carbon content of from eight to ten points, it will exhibit a tensile strength of 65,000 lb. per sq. in. At that tensile strength, it will show a high degree of ductility as measured by 35 per cent elongation in 2 in. These figures can hardly be reconciled with the properties of any mild rolled steel that we know today, and they become more surprising when it is realized that this material shows these properties in the cast condition.

A cross-section through a weld made in one pass shows an obvious columnar type of crystallization. Correlative properties such as impact values, endurance values and corrosion resistance show values which are also out of the ordinary for material of this analysis and structure. Here is a material in a condition which, by all the tenets of the usual metallurgy, should exhibit properties inferior to the product of the rolling mill. It is believed that the seat of these extraordinary values lies in the extreme cleanliness of the weld metal as deposited by modern welding techniques which protect the fusion deposits from the atmosphere. The endurance value of this cast material, which should show directional weaknesses, is in the neighborhood of 30,000 lb. per sq. in., and this exceeds the values exhibited by the product of the open hearth.

Weld Metals May Give Clue in Search for Better Steels

Some time ago, various specimens of steel purposely made with different degrees of oxide inclusions were broken under the microscope, and the mechanism of their failures observed microscopically. It was interesting to

note that the grains of the cleaner steels developed a marked number of slip bands under load before failure. In contrast, the more oxidized steels failed through the grain boundaries before the grains themselves developed any slip bands. The more finely divided oxides in the oxidized steels were found to have been excluded to the grain boundaries which effectively isolated the grain elastically to a point where the breaking load was not high enough to deform plastically the material in the grain. Some place in this conglomerate picture that modern weld metal presents would seem to be a clue that steelmakers could well afford to investigate in their search for better steels. Today, the situation presents a picture in which the modern fusion deposits which can be used for joining rolled steel products have characteristics and physical properties which are superior to the material they join.

To sum up, the physical properties of these modern weld metals with respect to the mild steels they join and, what is more important, to the higher strength alloy steels in conjunction with which they can be used, offer a challenge of considerable magnitude to the open-hearth practices of today. Modern engineers—engineers with imagination—have at their disposal, if intelligently used, a material surrounded by a commercial technique which can sew together and integrate a mechanical structure from a series of composite pieces of rolled steel to meet service conditions in accord with the next step in industrial revolution.

Points Overlooked in Resharpening Milled Die Chasers

FOUR important, but frequently overlooked, correct practices in resharpening die chasers are discussed briefly in the current issue of *Threads*, published by the Geometric Tool Co., New Haven, Conn.

Milled chasers, it is pointed out, should be resharpened principally at the chamfer. They should not be ground on the cutting face unless necessary, and then only touched up very lightly, removal of only 0.003 to 0.004 in. at one sharpening being ordinarily recommended. Violation of this rule, a frequent occurrence, results in chatter of the chasers, with torn threads, or even broken chaser teeth. Milled chasers ground down to center or below are usually worthless. This grinding back continually on the chamfer and touching up only lightly on the cutting face from time to time is said to produce a threading tool that is free-cutting and that won't "bug" or load up on the softest of materials. Furthermore, as all surfaces are flat the chaser is easy to sharpen.

Correct angle of chamfer for the work to be done should be kept in mind when ordering or resharpening chasers. For threading close to shoulder, short chamfer chasers should be used, or the chasers available should be resharpened with short chamfers, recessing them on the top if necessary. More chasers are said to be broken because they run into a shoulder than from any other cause, and although some of the breakage is the result of accidents, a good deal of it can be avoided by using chasers with the correct angle (or length) of chamfer.

In rechamfering chasers, particularly in recessing them on the top to get close to shoulder, the chamfer should extend below the root of the teeth on the chasers. Otherwise a flat surface rather than a cutting point will be produced, resulting in chipped or broken chasers. This should be carefully checked after resharpening. The chamfer should run out on to the top at a point below the root of the thread on the chaser.

Different materials require different face grinds. Stainless steel and cast brass, for example, cannot be cut with good results with the same set of chasers. Chasers should be ordered, therefore, for the materials they are to be used on and if a change in material is made, they should be reground accordingly.

Attractive Finish Helps Metal Products Sales

18 — Importance of Color

By HERBERT R. SIMONDS

SALES of a wide variety of metal products have been increased through the use of different colors or color combinations in finishing. The simpler colors were used at first because of the cost and technical difficulties involved in the use of the more complicated shades. Now, however, lacquering and enameling processes have so far developed that the manufacturer is not handicapped in his selection of color. The question naturally arises, what color will have the best sales appeal? This and other questions relating to the use of color in finish of metal products are here discussed.

A MANUFACTURER of typewriters found sales lagging and called a board meeting to discuss means of stimulating trade. *Someone* at this meeting made the startling suggestion that typewriters, which until then had been offered in a black finish, might be advisedly finnished in various bright colors. After considerable hesitation this was finally done, and sales immediately started to improve. Here in a very real sense was a case where rainbow shades took the company out of the red.

The Victor Saw Works, Inc., Middletown, N. Y., was another company to take the initiative in using a colored finish, and here perhaps the experiment was even more unusual, for few would have thought that a gold finish would help the sales of prosaic steel hack saw blades. But it did.

The color vogue in kitchenware of some years ago increased sales of one company by more than 30 per cent. Other examples of the advantage of color could be cited in most every branch of the metal industry. Farm machinery sells better in bright colors, and machine tools are no longer black. W. J. Miskella, consulting engineer, Chicago, has pointed out that the depression years of color in industry occurred back in 1909 and 1910 when practically all automobiles were black. One reason for this was the clamor for more and more cars, which left no time for experimenting with colored finishes.

Dark Colors Easily Applied

Mr. Miskella says:

"Japanning, which is a process of baking a dark coating material on metal, fitted right into the spirit of the times, for metal articles could be produced with a fine glossy black finish over night. They would be dipped or sprayed one day, baked during the night, and delivered the next day. Manufacturers simply had to use black because no other color could be applied quickly.

"Even as late as 1927 the japanning finish was in vogue and in one plant an average per furnace of 4800 lb. of automobile parts would be baked, unloaded, and transferred to the shipping room in less than 1 hr. Twenty years before, each one of these loads would have taken 4 hr. to bake, and today the same operation can be performed in 20 min."

The non-metallic materials discovered the sales value of color before the metals. Notable in this line were plastics, bricks, terra cotta, glass, cement, and wood. But the metals soon caught on and started in to make up for lost time. Again quoting from Mr. Miskella:

"Within a comparatively few recent years there has developed in the metal industry a wide demand for color to get away from the black, black, black which at one time was so closely associated with metal that many felt the two in some strange way were inseparable. If you wanted an article made of metal, it had to be black."

The first serious break from black in metal finish occurred in connection with automobile bodies about 1924. Since then, the use of color has spread rapidly to include almost all metal products. A visit to a typical hardware store will disclose red stew pans, green metal cups, and yellow sugar cans. Small tools may be found with handles in almost every shade. Even silver colored ranges and gold lawn mowers are available.

The Cost of Color

SEVERAL manufacturers of popular metal items, who were questioned on the subject of color, said they would not return to black even to save the entire cost of finishing. The new lacquers of today, according to Mr. Miskella, give everything to be desired in physical and chemical properties, and in meeting psychological demands. It is true that many of the colors are still relatively expensive as a finishing material, but each year the increased use of lacquers and the research in synthetic enamels make possible a greater coverage per dollar invested in the coating material.

Lacquers suitable for the finish of automobile bodies were slow to develop. There were manufacturing difficulties, and fast dyes in quantity were hard to obtain. In addition to this, it was not apparent at first that an association of bright color and metal would be favorable in the minds of the public. "The period of transition from black to color lasted from about 1924 to 1928," states one au-

thority. "During the early years, manufacturers of many practical metal products noticed but little difference in the sales value of a bright color as against a dull one."

What Color Is Best

A MANUFACTURER of cream separators observed that one particular model finished in a light blue enamel showed an encouraging increase in sales. Investigation seemed to indicate that at least some of the credit should go to the color. Since that time, definite experiments have been made, which indicate positive increased sales value in certain colors for certain products.

The most pronounced increase in sales value seems to derive from a pleasing combination of two or more colors on one product. It is difficult, however, to lay down any definite rules because the element of style is so large a factor, and a color for a certain product may have high sales value for several years and then lose this value almost entirely.

Manufacturers generally are coming to appreciate the importance of knowing what color will have the highest sales value, and to find this answer some large organizations have added to their staffs experts whose duty it is to introduce factors of design and color to products sold to the public. A chain store system has organized a sort of sales advisory department which constantly studies the reaction of the public to different colors and different styles of packaging. When asked which colors created the best sales appeal, one investigator said:

"It is impossible to state definitely, but an indirect approach may be made. Take, for example, an old kitchen stove finished in the natural iron finish. The best you could expect to get for such a stove would be a little more than the cost of labor and material entering into its production. But dress up that same stove in cream and buff colors and add a few incidental frills and notice what happens to its value. If it sold for $20 unfinished, it might easily be expected to sell for $50 in the finished form. Thus, by the medium of color, the product is lifted out of the category of price per pound, into another world where price per unit is the custom."

Suit Color to Product

AS a rule, light delicate pastel colors which appeal to women have the highest ratio of sales value, while the darker, cold and somber colors are less stimulating to the buying instinct. Nevertheless, a delicate color would seem decidedly out of place on a motorcycle.

From this it may be judged that color alone is not the solution. It must be the right color for the right product at the right time. Industry is in an experimental stage as to color and finish. Means exist for finishing metal in almost any desired shade or tint. Wash bowls and bath tubs in delicate lavender, supplied with satin nickel hardware, may appeal to some buyers, but the attention-getting value of the unusual is undoubtedly a factor here. This is shown by the fact that some manufacturers are turning to the now unusual black as a finish for bathroom equipment.

Some time ago the foreman of a machine shop decided to use colors throughout his plant, and asked the opinion of several experts as to the shades. He found many plants where the traditional battleship gray had been discarded in favor of brighter colors, but he could find no agreement on any one standardized scheme. He finally decided to let the workers themselves make the selection.

Colors for Machine Tools

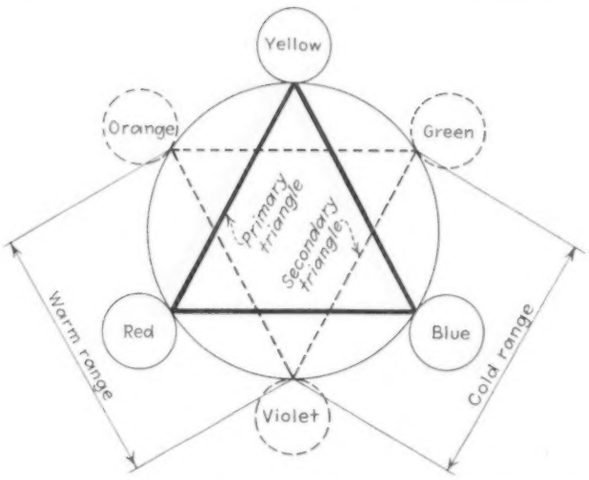
In describing his experiment, he says: "In order to avoid too much of a rainbow effect, we laid down a policy that all machine tools in the same room were to be painted in the same color scheme, but we let the machinists working in each room decide the colors for that particular room. This privilege of decision gave a more personal interest in the matter and resulted in a mild rivalry between the different rooms. We suggested painting movable parts a different color or a contrasting shade, and the room which we finally considered most successful has the following colors: The floor is a dark gray. The walls for a distance of 6 ft. above the floor are gray, but two or three shades lighter than the floor. Above the 6 ft. level the walls and ceiling are egg-shell white. The bases, frames, and stationary parts of all the tools, including electric motor frames, are marine blue, and the movable parts are all straw yellow. Such parts include the spokes of wheels and in fact all unmachined surfaces which have movement during the operation of the tool."

Color Characteristics

A FEW of the basic characteristics of color should be considered by anyone selecting color combinations for metal products. A popular fallacy, for instance, places the combination of black and white as most legible, whereas tests indicate that it comes far down the list. One investigator, Le Courrier, places white on black as No. 10 in a comparative legibility table in which black on yellow comes first. Such a list is shown in Table 1. It is interesting in this connection that several watch manufacturers are now departing from the use of the traditional black and white for dials, to use combinations such as blue or green against white, which are more legible.

Lacquer spraying of metal dial disks for watches and clocks is now a standardized automatic process, and any desired color may be used. One type of machine used for this work is shown in the accompanying illustration.

Another quality of color which should be recognized is visibility at a distance. Blue and violet, for instance, become indistinguishable at a distance of about half a mile, whereas red can be identified at three miles or more. The diagram of the primary and secondary colors shown in the accompanying sketch forms a good means of visualizing the structure of the spectrum. From the three primary colors, any of the thousands of colors used in industry may be devel-

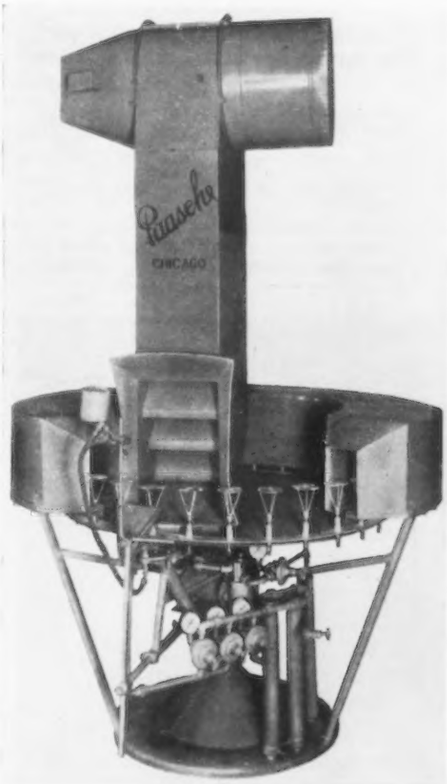


A color diagram helps to visualize the scheme of color mixing and blending. All of the colors used in industry may be derived from the three primary colors, yellow, red and blue.

This shows part of the modern metal finished fountain grill at Gimbel's in Pittsburgh. The table tops are micarta inlaid with colored aluminum. The booths, counter stools, and parts of the decorative trim are made of aluminum.

❖ ❖ ❖

This automatic machine is used by the Waltham Watch Co., Waltham, Mass., for coating watch dials. In this field, colors are being used for the dial background, to increase readability.



oped. Yellow and red, for instance, make orange, which forms one of the group of three secondary colors.

In a similar way, any other two primary colors, blended equally, produce a secondary color, and any two secondary colors produce a tertiary color. For example, the two secondary colors, orange and green, will produce the tertiary color, citron. Violet and green produce olive, and orange and violet produce russet.

Color Variations

COLOR variation may be made either by using varying parts of two or more established colors, or by mixing any one color with black or white. Variations of the latter character are known as tints and shades of the foundation color, the tints usually designating the blending with white, and the shades the blending with black. However, the metal fabricating company need have no actual contact with mixing or blending, as most of the companies manufacturing enamels for use on metal products have developed colors and processes to meet a wide variety of conditions. Different colored enamels, for instance, formerly required different lengths of time for baking, and the manufacturer of a metal product often would base his color selection on this feature rather than on the actual appearance value of the color.

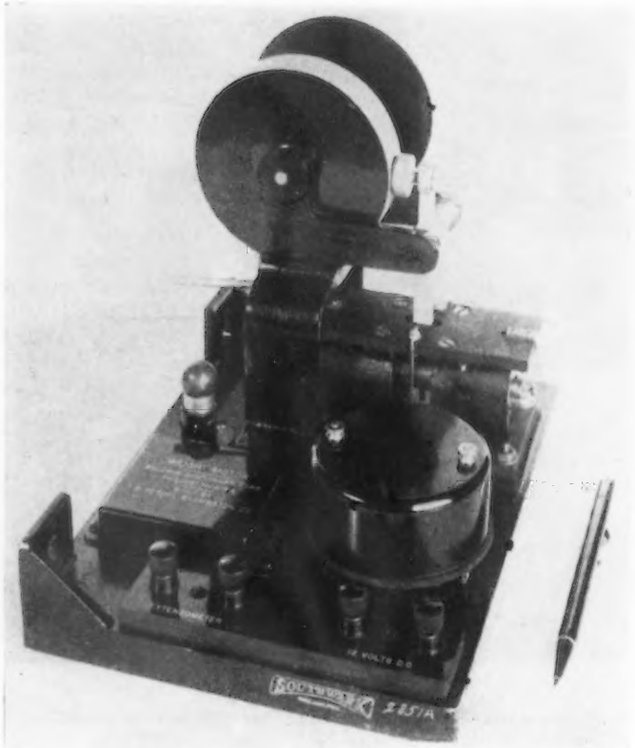
Colors produce varying emotional reactions which seem fairly well standardized for most people. Thus a blue is known as a cold color, whereas a red is a warm color, and most color variations take on either a cool or a warm connotation, depending upon whether the blue or red element predominates. Russet, for instance, which contains both blue and red, is a warm color because the red predominates.

When metal products are finished in the cool colors, they usually appear larger than they actually are, and, conversely, when finished in the warm colors, they appear smaller. If a high color contrast is desired, it is more easily secured by using a warm color against a cool color than by contrasting two warm colors.

Color Harmony

COLOR harmony is a complicated and highly specialized subject which becomes the life work of some designers. Mr. Miskella, in his book, "Practical Color Simplified," devotes a full chapter to color harmony. However, only the briefest statement of principle can be given here. Harmony in color usually exists when there is a common color present. Thus, orange and green harmonize with each other because yellow is in each. For the same reason, brown harmonizes with orange, green with crimson, orange with light blue, and gray with lavender.

The addition of a little gray to any two colors tends to make them harmonize, and in a similar way, white may be mixed with one color and black with another to bring the two into closer harmony. However, in spite of the above, no set rules can be established, as the relative amount of



Several companies now regularly produce sheet metal in striped designs. Stripes are produced either by a special process of polishing or by the application of a lacquer finish, in which latter case any desired colors may be used.

(Courtesy Apollo Metal Works)

Even manufacturers of technical instruments find an advantage in using different colors for finishes, to make it easier to give instructions for use.

surface covered by different colors often determines the effect, independent of the actual color relationship. For example, a small amount of a discordant color may actually tend to emphasize the harmony of two other and more extensively used colors.

Color May Denote Quality

THE value of any color from a sales point of view is as dependent upon association as upon intrinsic qualities, and a favorable association may develop from advertising or publicity. Thus a red store front, while in itself not particularly pleasing, may become identified with a certain store chain and may thus take on a definite advantageous property.

Perhaps the greatest value of color is now found in the automobile industry where it is frequently the color of a car, independent of anything else, which produces the sale. At automobile shows, it is the attractively colored cars which receive greatest attention. Here the value sought is uniqueness or individuality rather than association with any one make. Designers who have studied the question of value of color on automobiles admit their inability to give any rules for attractiveness on sales appeal. Any one color, however appealing at first, loses its value as soon as it becomes identified with mass production, and from this fact one definite rule emerges. "Break up the uniformity of any one model by bringing out cars in several different color schemes."

Buyers Identify by Colors

HAVING once identified a certain product with a specific color, it then becomes important to maintain this color unchanged, and this brings up one of the most difficult points in the whole realm of colors in industry. The human eye is a variable instrument, and even a color expert may see differently when he has a bad headache. Also, colors appear differently in different lights, and for this reason artificial lights which accurately reproduce the qualities of sunlight are used for most color matching.

Recently a color measuring instrument was developed which bids fair to be important in industry, as it is based on the principle of the photo-electric cell, and is independent of the human eye. In describing this instrument, Arthur D. Little, Inc., states:

> "The standard electric eye with known spectral sensitivity is here substituted for the human eye. The instrument can be adapted to the requirements of high speed production, and it may be relied upon for strict impartiality.
>
> "Color is often an indication of quality, and when once established, great care should be taken to maintain its uniformity. In certain chemical operations and in heat treating of metals, the color in itself is not important, but it is an indicator for controlling operations.
>
> "Because of the infinite number of possible hues, tints, and shades, colors cannot be described precisely, and although some international standards have been adopted, color terms in a popular sense are loosely used, and samples tend to deteriorate with age. Because of this, the photo-electric color instrument is of the utmost importance in producing permanent records."

An example of the value of color is seen in lubricating oils where, independent of the lubricating properties,

TABLE I

Legibility of Color Combinations
(Le Courrier)

Order of Legibility	Decoration	Background
1	Black	Yellow
2	Green	White
3	Red	White
4	Blue	White
5	White	Blue
6	Black	White
7	Yellow	Black
8	White	Red
9	White	Green
10	White	Black

TABLE II

Comparative Visibility at Distance

Color	Miles
Red	3
Green	2.5
White	2
Yellow	1
Blue	0.5
Violet	0.5

certain popular colors must be introduced for the sales value.

Enamels Extend Use of Metal

AS the technique of applying color in different designs to metal products improves, the scope not only of the use of color but of the very use of metal itself increases. The Ferro Enamel Corpn., Cleveland, for instance, has developed a method of applying porcelain enamels in special designs to sheet metal, and thus has made it possible to produce decorative mural panels in metal. A description of this method and of the use of colored enamels on metal will be included in a subsequent article on lacquers and enamels.

Metal Colors

ONE of the most satisfactory ways of utilizing color effects in metal products is to take advantage of the inherent properties of different alloys, which basically give the desired color characteristics. In many alloys, particularly those of copper, a wide range of color is possible without materially sacrificing physical characteristics. Beryllium copper may be made to so closely resemble gold that detection is difficult. Unusually rich colors are obtained by mixing the two common elements, copper and zinc. A red brass with 85 per cent copper and 15 per cent zinc is extensively used, to contrast with the white metals, such as stainless steel and aluminum.

Protective-Atmosphere Electric Furnace Used for Brazing

THE use of protective-atmosphere furnaces for such operations as electric furnace brazing, bright annealing, scale-free normalizing and many other applications, has gained impetus during the past year. Furnaces of new types have been designed to meet individual requirements, and devices are available for producing low-cost gases used as furnace atmospheres.

A complete equipment as shown in the photograph has been installed for demonstration purposes in the General Electric Service Shop, Cleveland. This production unit consists of a box-type furnace with automatic temperature control and gas processing equipment, all compactly arranged and requiring little floor space. Of particular interest is the combustion-type furnace atmosphere controller, which supplies the reducing atmosphere by reforming natural gas by partial combustion with air. This atmosphere gas is obtained at approximately one-fourth the cost of natural gas because of the large volume increase resulting from the addition of nitrogen from the air employed in the partial combustion.

The furnace is built to hold one tray-load of parts in the heating chamber and two tray-loads in the adjacent water-jacketed cooling chamber. Sliding gas-tight doors at each end and a refractory door between the heating and cooling chambers allow ready passage of the work, and conserve heat or gas when they are closed. The furnace can heat 80 lb. gross per hr. Trays are 11 in. wide x 24 in. long, weighing about 4 lb. each. The maximum working height is 5½ in. The charging cycle is approximately five trays per hr., depending upon the weight of the parts.

The furnace has side-wall ribbon resistors rated 20 kw., 65 volts, single phase, and is equipped with an automatic power control panel connected in the high-voltage side of an air-cooled transformer, rated 60 cycles, 20 kva, 220/65 volts, single phase. On the instrument panel is a Leeds & Northrup indicating temperature controller, scale 1000-2500 deg. F. The control board includes a starting switch for the compressor motor.

The G-E combustion-type furnace atmosphere controller with this furnace is similar to that described and illustrated on page 19 of THE IRON AGE of Nov. 2, 1933. However, this one is smaller, being rated 200 cu. ft. per hr. output as compared to 1000. The combustion chamber and the surface cooler are mounted vertically with the visual flow meters on a panel, beneath which is the motor-operated compressor set for regulating the air and gas pressures. The device is compact, portable and self-operating, and is set up beside the furnace.

The electric-furnace brazing process involves the passage of tightly assembled parts through an electric furnace, in which the reducing atmosphere serves as a flux. The brazing metal, applied during assembly, melts and flows into all joints by the aid of capillary attraction. Upon transfer of the parts to the cooling chamber, the brazing metal solidifies, giving exceptionally strong tight bonds. By heating and cooling the objects in the controlled atmosphere, surfaces remain clean and bright.

Brazing steel parts with copper is the most-used combination, because of the exceptional strength and tightness of joints—the readiness with which copper flows on most steel surfaces without the aid of a solvent flux—and the fact that copper can be applied in the form of wire or powder-paste as required. Low temperature brazing alloys in the form of wire, with flux, are also used at times with success. The brazing of non-ferrous metals with low-temperature alloys is also sometimes practicable, where sections are sufficiently light to allow quick heating.

Cost savings are frequently made by the substitution of electric furnace brazing for some other means of fabrication, such as riveting, soldering, torch brazing or welding—for expensive forgings or castings—or for machining from solid stock. Thus certain drilling, machining or hand operations are minimized or avoided, and subsequent cleaning of parts is unnecessary. Steel is often substituted for more costly metals. Several joints in an assembled part can be electric-furnace brazed during one trip through the furnace.

With Compliments to Mr. Connery

The Futility of a Blanket Prescription for Shorter Working Hours

By H. P. LOSELY

THERE is plain evidence of a strong and persistent sentiment in favor of legislating shorter hours for industry. A year ago, Senator Black introduced his 30-hr. bill and it was passed by the Senate with little opposition. Further action in the House was only averted by the hurried drafting of the Recovery Act. While the latter measure has helped in many places, there are still millions of unemployed; so it should be quite comprehensible that heavy pressure is being brought to bear to "do something about it." Mr. Connery, chairman of the House labor committee, recently reported a brief bill to the House which would make the 30-hr. week mandatory in industrial codes. With our penchant for passing laws instead of correcting bad conditions, we may yet see Congress enacting some blanket legislation which will impede rather than aid recovery.

This action was all the more symptomatic of sentiment as it came on the heels of the March convention of the code authorities. The difficulties of achieving any blanket reduction were there clearly emphasized in discussing the President's request for a 10 per cent cut in hours with a 10 per cent raise in pay. Yet Mr. Connery's bill proposes at one step to go even further than that, prescribing the same pay for 30 hr. as for any longer week now in force.

Such confusion of counsel indicates a widespread lack of understanding of the problems involved. Much of the discussion has been motivated by the simple desire to shift the burden of support from one group to another. Tactics of that sort may ultimately develop into open battle between PWA and NRA. If industry does not reemploy its normal quota, it may be taxed to support public works for the discharged. So it should be helpful to attempt to measure the industrial forces at work and thus gain some light on how far we might safely go in shortening the hours of labor in industry.

THEME

1. The pressure for shortening the hours of labor.
2. The average technical possibilities.
3. Obsolescence factors and abundance of replacement work.
4. Overhead costs and purchasing power.
5. Possible objectives and counter-proposal.

The basis of the agitation for shorter hours is substantially that the machine has displaced the man and so caused unemployment. Mr. Green during the last two years has frequently cited cases in evidence, and he does not lack material. Having contributed my share of labor-saving devices—and without apologies for more to come—I have no inclination to minimize the importance of the rôle of the machine in industry. But the popular concept, based on surface appearances, has much over-rated the robot; if we submit its machinations to more thorough scrutiny, we may see the wisdom of a course rather different from blanket reduction to a 30-hr. week.

When the Truth Is Not the Whole Truth

Here are some figures cited by Mr. Green. A glass-bottle machine with one man turns out as many as 69 men by hand. A machine for beating gold-leaf reduces one group from 64 to seven. A ditch-digging machine with one man can do the work of 44 men with shovels. Other writers have quoted similar Frankenstein figures, and they are no doubt accurate so far as they go. But bare statements like these are not the whole truth and, fortunately, many protagonists of the machine have lately been presenting examples of more complete accounting. Even in agriculture, where the apparent displacement is most spectacular, it has been shown that the bulk of the labor displaced has been the unpaid labor of the farmer's family and that, if we take into account the labor used to design, build and maintain the anathematized power implements, the net displacement of labor ceases to be "alarming." Of course the cost of production has been reduced, as elsewhere, or there would be no advantage in using the machine. The reasoning of the machine builder is that lower prices, made possible by the machine, make an added margin of purchasing power and so cause reemployment by demand for more or new goods.

Then we have our Technocrat friends who talk about a power age. Stuart Chase declaims on the theme of a billion wild horses. The argument is advanced that, because the average worker now has five or ten cents worth of power to add to his hour's labor, output can be increased in proportion to the increased energy consumption. That reasoning is illogical. Power processes are often very wasteful of energy—they can afford to be. For example, the energy used per stitch by a power-driven sewing machine is far greater than that used in a hand-made stitch. The hand merely moves a light needle; the machine has to drive cams and shuttle and con-

tinally reverse the motion of a heavy plunger traveling at high speed. But the operator's hands are freed from the needle.

It Takes Labor to Build Machines

The problem of the machine is not how much energy it dissipates, but much more complicated questions raised by transfer of skill. There is the obvious transfer of skill from the man to the machine at the point of production, but we must not lose sight of the concentration of science and skill on building the machine, nor of the uncertain length of life of the machine itself. For with the machine cast in the stellar role, it seems to have created in the mind of a gaping populace an illusion that it has built itself and will last as long as Sarah Bernhardt. We are dazzled by the spotlight on the finished performance and forget to look behind the wings to see the arduous work of preparing the show. Like a stage production, the machine has its run, but is soon cast aside and new ones must be built; there is much skilled labor used to that end, as will presently be brought out.

If we are to consider a radical shortening of hours for industry at large, we need to consider, not the spectacular case, but the general average. Fortunately we have a guide in the reports of the census of manufactures, from which we can extract data on the productivity per worker. For the country as a whole, it appears that output per man is some 40 per cent greater than in 1921. Our average worker Michael in 1921, *using the machine he had then*, added $2,650 to the value of his raw materials. If Michael's successor in 1933 had worked the typical 48-hr. week of 1921, and the product had been sold at 1921 prices, he could have produced, with the average 1933 equipment, an added value of some $3,700 instead of $2,650. That is a great increase, but obviously not enough to justify a flat reduction of hours from 48 to 30 per week. Merely to maintain the standard of living of 1921 would require at least a 35-hr. week. Yet every political party is irrevocably committed to deliver a higher standard of living; besides that we have meanwhile acquired a more elaborate government establishment to maintain and most of us have depleted reserves to replace.

Life of Machine Is Short

Unhappily for our legislators, struggling with the maze of economic complications, the problem does not lend itself to solution by the simple rule-of-three of common arithmetic. We must examine the mechanism by which productivity has been raised. Michael's increased output has not been gained by mere rubbing of an Aladdin's lamp. Literally billions have been parceled out to our technicians for experiments in every field and construction of better equipment for Michael to use. Our modern industries use machinery to such an extent that the capital invested in the machinery Michael uses may cost as much as Michael's wages for three years or even more.

But the life of the machine is short. Even if built mechanically to last a generation, it may have no place in the next five-year plan. So its life must be one of crowded hours; for, if its rate of use is low, it may have to be discarded before it has paid its way. If that happens too frequently, bankruptcy for the owner is inevitable. Many of us see the same buildings day after day, and are misled by their appearance of permanence. We do not see the constant change going on behind the walls. For while land and buildings bulk largely in our inventory of national wealth (they were two-thirds of the total in 1928) these items are of lesser significance in industry, where we frequently find a million dollars worth of machinery housed in a hundred thousand dollar building, —and it is the obsolescence of the machine that we have to worry about, before we shorten hours.

Machine Has Double Hazard

The hazard to the machine is a double one. Just a few examples will give the requisite emphasis to the risk.

First comes the hazard of a fickle public, ever ready to abandon one product for a newer one. We all suddenly decide that our new homes shall have a better method of heating. If sheeted ducts carrying conditioned air are superior to the cast iron radiator, all the elaborate paraphernalia of the radiator foundry becomes so much junk. Or Mr. Bernays manipulates some adroit publicity, a leading celebrity parades a new fabric, and presently hundreds of looms must be rebuilt. Norman Bel Geddes is reputed to have cost America a billion dollars with his streamline and modernistic designs—or made a billion of new business; how you look at it depends whether you were the client spreading the net for fresh trade or his competitor trying to sell the old line of merchandise and avoid new investment.

Not many years ago there was always a tapering off to mitigate the impact. Farmer Corntassel neither knew nor cared about the latest thing in styles and his trade was a shock-absorber. The movies and radio have done away with much of that—not to mention the agricultural college and low farm earnings. Now even Sears-Roebuck hires a designer to modernize its washing machines. We move more and more in concert; the demand for the new pervades everywhere; last year's model is "out" and the machine to make it must be rebuilt.

The Impact of Obsolescence

But that is not all. The machine itself is never good enough. Look at Mr. Green's first example. At its inception, the idea of a machine to make bottles seemed a chimera of a crazy inventor, even to the blower who used to contract facial neuralgia. Yet one was eventually perfected and plastered with patents and the owner, with a false sense of security, built enough machines to supply the whole country with bottles large and small. But once it had been proved that a machine could make bottles, a rival devised new methods, and with a new set of patents, proceeded to sink another fortune into bottle machines. Our goddess of competition is now served by enough machines to make perhaps twice as many bottles as we ought to have.

Only recently, THE IRON AGE told how Mr. Ford had again done the impossible and now makes better crankshafts out of steel castings than from the hitherto indispensable forgings. That is the exit cue for an investment in "fixed assets" for making steel billets and forging them to shape. Those who have eyes to see can find a story to match in almost any issue of any trade journal. Chemist and engineer search continuously for new devices, new processes, even new basic materials. They discover bakelite, rustless steel, cellulose lacquers—and a new material may alter a whole technique of manufacture and send carloads of machinery back to the foundry.

Even the railroads, with their monopoly on the transportation machine seriously weakened, now feel acutely the impact of obsolescence. Not that it is a new problem to them —steel coaches, 70-ton gondola cars, refrigerator express and more efficient locomotives to haul heavier trains all present the dilemma of writing off equipment before it is totally worn out, if indeed there is not still an equipment trust marker tagging the property. But the pace is being accelerated, *and unavoidably so.*

Remaking the World

For that is the challenge of our times. We cannot pause for a philosophic argument, although we may

cogitate like the cobbler, while the work goes on. The facts are that the flood of new ideas, scientific, technical and social, are forcing us to remake our world while we live in it. We cannot command the tides to stand still while we devise a perfect plan. We are moving toward more planning in our economy—even Mr. Leffingwell of Morgan's recently characterized the "wait-for-nature" course as hopelessly stupid—but recent events should provide ample evidence that the millennium will not come tomorrow. Meanwhile the individual factory must plan to adopt the good piecemeal and be prepared to discard it after brief use when better is offered. There is no escape from the result of the equation—a high rate of obsolescence is inevitable, at least for the next decade.

Deferred Maintenance and Replacements

What has all this to do with the hours of labor? It is an outstanding factor in the case, and yet the most neglected one. We had before the crash an investment of some $30 billions in our industries. The process of obsolescence sends it to the scrap-heap at a rate of about $6 billions a year, making a potential replacement business equal to the whole building industry in pre-crash years. But the replacements and new investments are not made at a steady rate. We do five years rebuilding in three and then almost quit for the next three, scare the banker stiff, and make him the scapegoat for the depression. Our present national position is that for the last four years we have been deferring maintenance, renewals and replacements to an unprecedented extent. Only a few months ago competent estimates placed the amount of this withheld backlog of business of all kinds at between $30 and $40 billions; that is an amount equal to the earnings of our entire wage-earning class for a whole year.

The obstacles in the way of wider reemployment are not shortages of work, but widely ramified disturbances which block normal capital expenditures. In the last resort, it is not a question of whether there is work to do, but rather upon what terms and conditions it will be done. An excessively short work week, arbitrarily prescribed, will not be a condition conducive to getting the work done.

Interest Smallest Part of Load

If I have emphasized the obsolescence factor, it is precisely because there is a common lack of appreciation of its double effects. On the one hand, rapid obsolescence provides fresh work; on the other hand it becomes a substantial part of the cost of production. We hear much about the burden of interest, but in industry that is really the smallest part of the load. Whether wisely or not, we have adopted a pace of change which virtually compels industry to spend on the average about half as much on renewing the plant as it spends on labor to operate the machines.

That at once raises the question whether such a pace is not a killing one. It certainly is not bucolic. The administration of an industrial enterprise demands a great deal from the men entrusted with it, and failure to use capital wisely becomes more rapidly fatal. Yet, the pace need not be disastrous if our technique is adapted to it, as will be suggested in the conclusion.

Why There Is a Limit to Reduction of Hours

Part of the technique of overcoming the high cost of obsolescence is naturally to crowd as many productive machines hours as possible into its useful life. An example with figures may be slightly tiresome, but will bring out more clearly the practical limits to shortening hours of labor. A factory with 100 men at its machines, earning $1,500 a year each, is likely to have an investment in plant of $500,000, and to survive as a permanent institution should be spending $100,000 annually on product development and remodeling of equipment. If the worker puts in 2000 hr. a year, the firm spends 50c. an hour on his machine and gives him 75c. an hour. If Congress now prescribes that his hours be reduced to 1500, *without reduction of income*, his wage must be raised to $1 an hour, and besides that the cost of the machine will be raised to 67c. an hour. The cost of an hour's output is raised from $1.25 to $1.67, but since there is no additional purchasing power added to the national income (unless the worker uses his free time in non-industrial work), that would seriously hamstring much business. Even if we assume that the plan can go from one-shift to two-shift operation, hiring an extra man for each machine, the balance is still adverse. Where the plant formerly sold one hour's output for $1.25, it must now dispose of two hours' output for $2.67, but it has only added $1.25 to the general purchasing power—paying out $2 wages where it formerly paid 75c. Obviously that will not work.

The flaw in the procedure prescribed by the Connery bill is that it would raise costs by more than the raise in pay. Our legislators must learn that we can no more devise a *perpetuum mobile* in economics than in mechanics. No plant owner can long give out more than he takes in. It is now generally understood that, to bring about reemployment in industry, purchasing power of the public must be increased, but there seems to be less comprehension that any measure which lifts costs faster than wages is in effect a reduction of purchasing power, and therefore a hindrance to recovery.

If then a universal 30-hr. week on the proposed terms is condemned as an economic impossibility, is there any sound alternative for unemployment relief in and by industry?

To deny the feasibility of a 30-hr. week generally does not mean that some shortening of hours may not be possible in some industries. In many cases two 7-hr. shifts, with a 35-hr. week, will provide sound basis of operation for both man and machine:—for the man, because it will provide normal sleeping periods and ample time for recreation and development; for the machine, because it will be worked fairly strenuously, to the end that it may yield a social profit before it has to be scrapped. And it is a basis which permits some adjustment of hours, up or down, to meet the needs of peak loads or seasonal dullness, without disturbing the worker's connection with his payroll.

NRA Must Demonstrate Courage

The present approach of the NRA, pressing each trade to work out its own contribution, is the soundest basis for attaining feasible solutions. But the NRA leadership will have to demonstrate more courage and nerve than it has done so far. Tenderness and reluctance to use discipline have been its weakest spot; that was quite evident from the complaints on noncompliance. If the administration permits an industry to set a pace so slow that the laggards will not be inconvenienced, then it will achieve nothing in that field.

A proposal that warfare should be waged in a leisurely manner, so that the lame and halt could keep in the line of march, would be condemned as preposterous. The army practices selection of the fit to maintain performance and discipline, or it cannot win battles. In the industrial battle for recovery, it is equally essential that the unfit be eliminated. For all too often, it is the attempt to run the obsolete machine in competition with the modern one, which drags down the whole industrial wage level, and purchasing power with it.

So the essential remedy is not a

blanket shortening of hours for good and bad till all share the misery. Relief will be attained by shortening the hours to zero for the inefficient machine, so diverting the work to be done to the efficient machine, where higher wages are economically feasible. The efficient plant must be allowed to develop its maximum social value by running its machines long hours, with only a reasonable limit, about 40 hr. a week average, on the hours of workers, whether they earn more or less than $35 a week.

It is not necessary for anyone to officially designate which machines are so antiquated that they should be returned to the furnace to be refashioned. What is necessary, is to determine how high the minimum wages in each industry may be safely placed when the good available machinery is used, and then bring the minimum wages in the code up to those levels, prescribing proper differentials to protect the wages of skilled workers and staff as well as those of the unskilled. That measure alone will give a tremendous lift to national income. The higher levels of wages will make it financially impossible to run obsolete machinery, will compel shifting of the worker from the inefficient machine or plant to the efficient one, and will make employment precisely where it is most needed, in the capital goods industries; for not only will men be put to work making better machines, but the increased income of millions of workers will revive home-building activities.

The process of raising the minimum wage will naturally have to be an affair of "easy stages." It can be continued so long as workers can be transferred to more efficient machinery, whether it is existing machinery at which room is made for more men by lengthening the hours of the best machines, or whether it is by devising still better machines and introducing them as fast as the owner can pay for them out of his share of the savings.

Getting the Production Out of the Superior Machine

To discuss the economic aspects of the latter case would require too lengthy a digression, but the principle involved may be at least partially stated: If a more efficient machine is introduced, compensation to workers should be increased in proportion to increased output, and the owner should derive enough profit to write off the cost of the machine well within its probable life; if the two conditions cannot be fulfilled, the machine is not socially justified. Inasmuch as the principle itself is barely recognized, it is hardly surprising that it has been widely violated.

Machines Must Be Socially Justified

So Mr. Green has good reason to complain, but not because the man has been displaced by the machine. The complaint should rather be that those left on the job did not receive an adequate share of the savings, or else the skilled and organized crafts took the lion's share; the unskilled were generally left in the lurch. Mr. Ford showed greater understanding; some years ago when he voluntarily raised wages of his unskilled help, someone asked whether he wasn't going further than necessary. Mr. Ford was reported as laconically commenting, "Well, they need it, don't they?"

Unless there is active wage protection, the owner of the obsolete machine all too often keeps it in operation by depressing wages to bring his cost down to the level attained by the more progressive owner of the new machine. A rising minimum wage is not only a safety device to prevent such undermining of labor standards, but will bring about a more healthy distribution of purchasing power. There is much truth in the charges that the management of our machines has been characterized by "reckless driving." But the strategy we must adopt to achieve control of the machine is to take social measures to spread its benefits, rather than to shut them off by shutting down indiscriminately.

Heat Consumption of Open-Hearth Furnaces

DATA on heat transfers in open-hearth furnace operation, and in particular the heat exchanges of the checker brickwork, were contributed by R. D. Abbiss, assistant chief engineer, Edgar Thomson Works, Carnegie Steel Co., Braddock, Pa., to the annual meeting of the American Society of Mechanical Engineers. The information and calculations based thereon are in full as follows:

The open-hearth furnace tested was a typical basic furnace of 60 tons capacity, built in 1903, and outside

(Concluded on page 42)

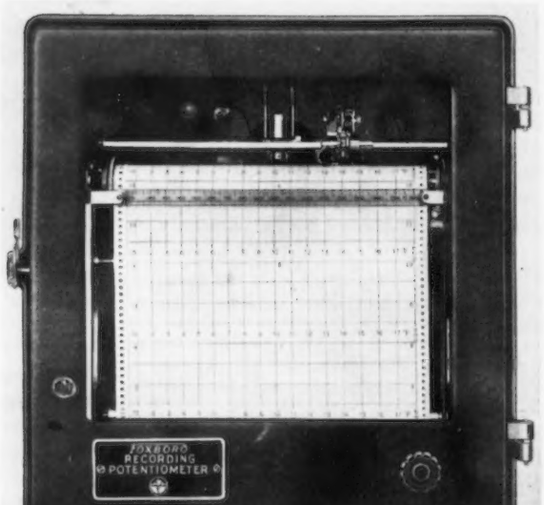
Heat Balance of Open-Hearth Furnace for Average of 10 Heats

Calorific heat in coke oven gas, millions of B.t.u.	228.214
Sensible heat in coke oven gas, millions of B.t.u.	0.272
Calorific heat in oil, millions of B.t.u.	167.884
Sensible heat in oil, millions of B.t.u.	0.373
Sensible heat in steam for atomizing, millions of B.t.u.	0.458
Gross heat input to furnace in fuel, millions of B.t.u.	397.201
Temp. of preheated air, deg. F.	2023
Sensible heat in preheated air, millions of B.t.u.	96.363
Heat input from chemical reactions, millions of B.t.u.	54.306
Total gross heat input to furnace, millions of B.t.u.	547.870
Sensible heat added to steel and slag, millions of B.t.u.	110,481
Heat absorbed by chemical reactions, millions of B.t.u.	13.577
Heat absorbed by combustion of H_2 (Latent) millions of B.t.u.	33.519
Heat absorbed by cooling water, millions of B.t.u.	19.660
Heat radiated from bath and port ends, millions of B.t.u.	73.800
Heat expended before entrance to checkers, millions of B.t.u.	251.037
Heat available at entrance to checkers, millions of B.t.u.	296.833
Temp. of waste gases entering checkers, deg. F.	2633
Heat in infiltrated air in checkers, millions of B.t.u.	0.163
Heat in waste gases leaving checkers to stack, millions of B.t.u.	185.587
Temp. of waste gases leaving checkers, deg. F.	1649
Heat in infiltrated air in flues to stack, millions of B.t.u.	0.701
Heat in waste gases to stack, millions of B.t.u.	169.154
Temp. of waste gases in stack, deg. F.	1186
Heat in air to checkers, millions of B.t.u.	0.905
Temp. of air to checkers, deg. F.	80
Heat in air from checkers, millions of B.t.u.	96.363
Temp. of air from checkers, deg. F.	2023
Heat radiated from checkers, millions of B.t.u.	15.951

From these data, the author gives the following tabulation of efficiencies:

Gross, of furnace, (based on gr. heat value in gas)	27.5
Gross, of furnace, (based on net heat value in gas)	29.7
Net, of furnace, (based on gr. heat value in gas)	17.6
Net, of furnace, (based on net heat value in gas)	19.2
Bath, (based on gr. heat value in gas)	28.6
Bath, (based on net heat value in gas)	31.2
Overall efficiency of furnace (based on fuel & air)	22.4
Overall efficiency of furnace (based on fuel)	27.8
Gross efficiency of checkers	85.9
Net efficiency of checkers	32.2

Recording Pyrometer Features New Balancing Mechanism



Large movement of pen or print-wheel is produced for small galvanometer deflection.

THE FOXBORO CO., Foxboro, Mass., has brought out a new recording potentiometer pyrometer featuring a balancing mechanism designed to produce a large movement of the pen or print-wheel for a small galvanometer deflection and to move the printing mechanism from one end of the scale to the other in minimum time, without requiring an extremely fast cycle or rapid motion of the mechanism. To this one feature is attributed the instrument's rapid frequency of records, long wear of the mechanism, and open, easily-read chart.

A V-shaped drive cam and a friction roller are major elements of the balancing mechanism. The sensing fingers, which detect the galvanometer deflection, position the friction roller according to the position of the galvanometer pointer. The V-shaped cam then engages and rotates the roller, which in turn transmits straight-line motion to the slide-wire contact, moving it a corresponding distance. The pen or print-wheel is mounted integrally and moves with the slide-wire contact, thus making the record coincide accurately with the measurement.

The recorder is housed in a new fume and dust-tight case that may be either flush or surface mounted. The door, of cast aluminum, is fitted with a large glass window, making the chart and the interior of the instrument plainly visible. The entire mechanism, including the drive motor, can be swung forward out of the case, making every part accessible for inspection. The drive motor is mounted in rubber bushings, which silence it and prevent transmission of vibration to the instrument. This synchronous motor is entirely inclosed, is ball-bearing equipped, and has a centrifugal starting switch. It has no brushes.

The printing mechanism is mounted on the top front of the multiple-record pyrometer. Each record is identified by a color. The printing styles of the rotating print-wheel are inked by colored-ink rollers and print the record on the upper surface of the chart paper. The record dots are square in shape and are large enough for the colors to be identified easily. The ink dries before the record has moved more than a few inches.

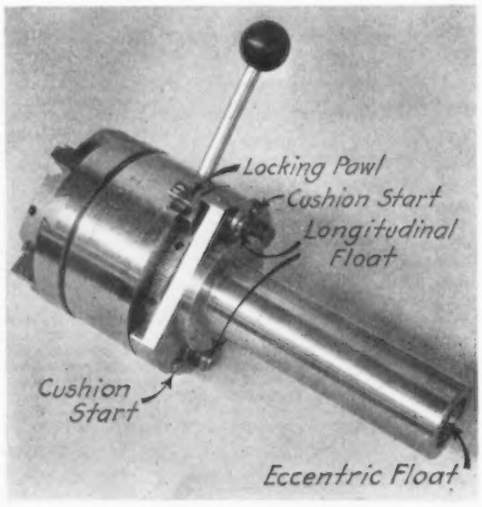
Just below the upper chart roller the chart passes under a graduated scale-plate of transparent, unbreakable material. This identifies the temperature values of the chart lines, and since it is transparent, the record can be observed through it. The connection compartment of the recorder is sealed from the interior of the case but is accessible from the outside, so that thermocouple or motor connections may be made or inspected without opening the compartment containing the mechanism.

Stationary-Type J&L Tangent Dies Now Available

THE Jones & Lamson Machine Co., Springfield, Vt., has announced a line of stationary tangent dies of pull-off type having several unique features in addition to those embodied in the revolving type tangent dies brought out a few years ago. Five sizes, with a threading range from No. 8-32 to 2 in. in diameter, are made.

Chaser holders are ground and lapped on the dovetails and have wide bearing surface on the ground and lapped dovetail slots in the die body, as well as on the die body face. They can be changed, if necessary, without disassembling the die.

These dies are locked by pushing the locking lever handle in one direction and may be tripped, when desired, by pushing it in the opposite direction. To make pitch diameter adjustments a spring-operated pawl, which engages teeth on the adjusting nut, is raised and the adjusting nut moved to the proper position. The pawl is then permitted to settle back in the proper tooth where it securely



(At left): Five sizes of the new J&L die, with range from No. 8-32 to 2 in. are made.

(At right): Arc welder with Lincontrol device installed on control box.

(At far right, opposite page): Littell automatic centering reel. One man can easily raise and load a 300-lb. coil.

locks the adjusting nut. The teeth on the adjusting nut permit adjustments of 0.00025 in. In addition, the diameter of the die plate, adjacent to the adjusting nut, has wide-spaced graduations to permit adjustments of 0.001 in.

The new dies are equipped with two springs set up under a predetermined pressure to permit a cushion start, and thus eliminate solid impact of the chasers and work. They are also provided with longitudinal float which permits the chasers greater freedom to reproduce their own accuracy. The driving flange is screwed on to the shank and dowelled in place, affording a drive at a point farthest from the center of the die. This drive arrangement also permits eccentric float to take care of misalinement of the die and work.

Amount of eccentric float is determined by the clearance allowed between the outside diameter of a shank integral with the die body and the bore of the outer shank sleeve. On most machines requiring stationary dies, a long shank may be employed, and by controlling the float in this long shank, the face of the die remains more closely at right angles to the center of the work.

The chasers for these dies are ground in the thread form at the exact helix angle for the diameter and pitch of the thread to be cut. They are interchangeable in revolving and stationary dies of the same capacity. Only one set of chaser holders is required for any right hand threads within the rated die capacity, whether standard or special and regardless of diameter or pitch.

Remote Control Device For Arc Welders

INCREASED output, savings in cost, and higher quality welds are claimed for a new remote control device, the Lincontrol, for arc welding machines, brought out by the Lincoln Electric Co., Cleveland. The operator can work at any distance from the machine and regulate the current accurately without making trips back and forth to adjust the controls. He taps the electrode on the work several times and the voltage is raised automatically; a larger number of taps and the voltage is lowered. Thus merely by tapping the electrode, making and breaking the circuit, the current output of the generator is controlled.

When work is begun in the morning, the welder is cold. After the machine is warmed up the current setting should be changed. Without remote control, the operator either uses the original setting with resultant lower speeds or makes a trip to the machine, thereby wasting time. Changing from horizontal to vertical welding or vice versa demands a change in electrode sizes. In working in the hold of a ship, this change, for example, means several minutes loss of time.

Since there is no temptation on the part of the operator to use the original current setting rather than return to the machine and reset the controls, the highest quality of weld metal is said to be assured. The device also permits use of the most efficient electrodes and therefore assures maximum speeds.

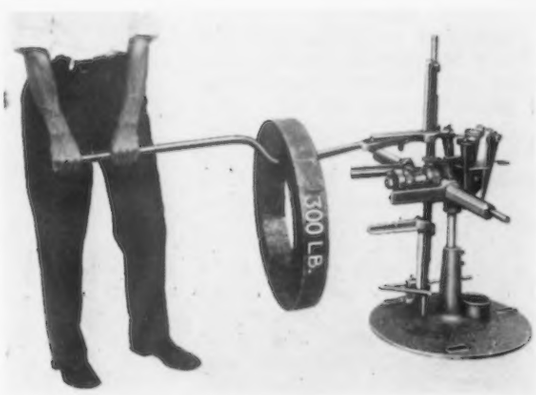
The device does not involve the use of additional cables or rheostat. Its mechanism is encased in a small box which may be quickly attached to the welder voltage control, and the regular hand controls may still be used as desired. The Lincontrol is optional equipment with the company's new shield arc welders, or may be purchased separately and installed on motor, belt or gasoline engine driven welders now in use.

Coiled Stock Reel Loaded Easily

QUICK loading and centering and easy running are features of the new 300-lb. capacity automatic centering reel, the No. 3, added recently to the line of the F. J. Littell Machine Co., 4127 Ravenswood Avenue, Chicago. It is stated that a 300-lb. coil of steel can be loaded on the reel and centered by one man in about 1 min.

As in the 500-lb. automatic reel, the No. 5, described previously, the arms are at all times equally spaced from the center of the reel. When a coil of larger diameter is to be placed on the reel the arm can be run out quickly to the larger radius by turning the reel like a capstan. This, it is pointed out, assures that the coil is balanced regardless of how large or how small it is or in how much of a hurry the operator is to go ahead and run, and is important inasmuch as most reels are used with automatic feeds. If the coil is out of balance and begins to run backward just as the feed starts ahead, the material jerks and is slipped in the feed rolls, resulting in short feed. With the coil running in balance this does not occur.

An additional feature of these reels for coils weighing up to 400 lb. is the quick loading lever which permits one man easily to load the coil on the reel. Provision is made for locking the reel spider from rotation during the loading of the reel. A special loading lever with snap pin is anchored to the upper arm, giving the operator an easy leverage to raise the coil and slide it on to the reel. This feature together with the automatic centering is said to make possible the loading and centering of coils in about 1 min. The reels are equipped with ball bearings, and may be furnished with motor drive which will maintain a definite amount of free material.



Improved Textolite Roll-Neck Bearings

AN improved line of Textolite roll-neck bearings has been announced by the General Electric Co., Schenectady, N. Y. Cylindrical segments ranging from 5 in. inside diameter to 30 in. outside diameter, with any desired wall thickness, any arc of contact up to 180 deg. and any length up to 28 in., are made, and several different grades, covering a wide range of properties, are available.

For heavy-duty applications, such as plate mills, blooming mills and

large rail or structural mills, a grade designated as the No. 2020 is offered. This is a graphite-filled, fabric-base material using an extra-heavy four-ply interwoven fabric, and recommended also for initial application in changeovers from bronze bearings where the roll necks are likely to be scored or rough.

Another grade, the No. 113, is a general-purpose bearing for rod, bar, skelp and merchant mills. It is a fabric base material using a medium weave fabric. Employed on the finishing stand of an 18-in. sheet bar mill, these bearings are said to have averaged over 100,000 tons of material passed through the mill.

A graphite-filled, fabric base material using a fine weave fabric is also available. This grade, the No. 2001, offers a smooth fine-grained bearing surface for such applications as hot-strip mills where it is necessary to have a minimum spring in the bearings. It is the least resilient of the Textolite grades but has considerable toughness. For copper and brass mills, steel rod mills and other machines where impact loads are light, a grade designated as the No. 575X is offered. This grade has a closer structure, and when properly applied is said to be the most economical bearing to use both from the standpoint of first cost and power saving.

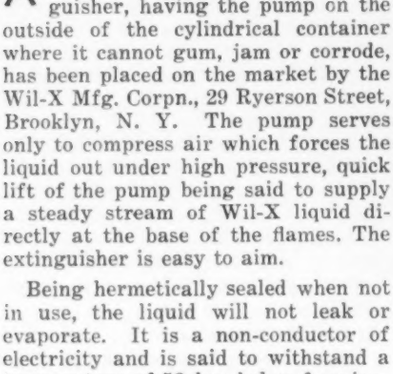
In addition to these grades for radial bearings, two grades are made in slab form for use as thrust collars. In some cases thrust collars may be renewed without removing the chucks from the mill.

Water is the only lubricant recommended. To assure ample supply of water it has been found desirable to use two sprays, one at the leaving side of the bearing for cooling and one directed into the chamfer on the "entering" side for lubrication. The principal field for application for Textolite bearing linings is at speeds greater than 120 ft. per min. where water lubrication is used. At lower speeds, the material is recommended only where the impact loads are so high that they would pound out babbitt or would cause pitting and scoring in bronze bearings.

New Fire Extinguisher

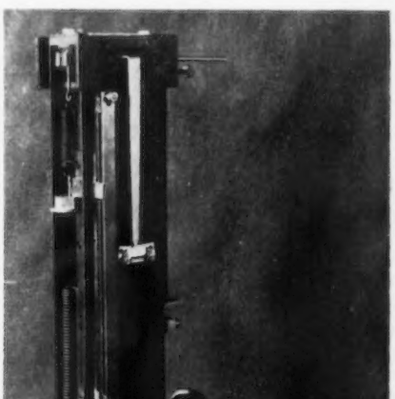
A "MACHINE-GUN" fire extinguisher, having the pump on the outside of the cylindrical container where it cannot gum, jam or corrode, has been placed on the market by the Wil-X Mfg. Corpn., 29 Ryerson Street, Brooklyn, N. Y. The pump serves only to compress air which forces the liquid out under high pressure, quick lift of the pump being said to supply a steady stream of Wil-X liquid directly at the base of the flames. The extinguisher is easy to aim.

Being hermetically sealed when not in use, the liquid will not leak or evaporate. It is a non-conductor of electricity and is said to withstand a temperature of 52 deg. below freezing. The pump and nozzle fold down alongside the extinguisher when not in use. The pump may be raised quickly, instantly opening the sealing valves. The valves close automatically when the pump is lowered, shutting off the stream and saving the remaining liquid.



Machine for Testing Light Springs

FOR rapid and accurate compression and extension testing of light springs the Coats Machine Tool Co., Inc., 110 West Fortieth Street, New York, is offering a new Elasticometer testing machine, designated as the type RS-5. This machine, used preferably for static tests, combines a tensioning device with a scale for "weighing" the spring load and a graduated vertical length scale for measuring the spring length. The drive consists of a handwheel-operated rack and pinion. Attached to the rack are the upper compression plate,



the lower tension hook, and the pointer for indicating spring length. The pointer is provided with a vernier. The stroke of the rack in either direction may be set to automatic stops, and use of these speeds up production.

The weigher scale consists of a single 1 to 1 beam. The lower compression plate and the upper tension hook are suspended from one end of this beam, the loose weights from the other. The lower plate is guided in steel balls that are free to slide in vertical slots. A pointer attached to the beam magnifies errors four times in the spring being tested. It indicates deviations from set length, at fixed load, but can also be used for indicating deviations in terms of load. Both sides of the vertical length scale are graduated, and the scale may be reversed when changing from compression to tension tests.

The machine is built for a normal load of 5 lb. but can be furnished for loads up to 12½ lb. Specifications include: Diameter of compression plate, 1¾ in.; maximum free length of compression springs and extended length of extension springs, 12 in.; height, overall, about 23 in.

THE NEWS OF THE WEEK

Enameling Institute Organizes for More Aggressive Sales Promotion

THE organization of an educational bureau to conduct technical research, market research, advertising and sales promotion and industry contact activities was authorized by the Porcelain Enamel Institute, at its fourth annual meeting held at the Hotel Statler, Cleveland, May 16 and 17. The board of trustees was instructed to use for this purpose such funds as are available from the general budget and will probably appoint a committee to work out a plan. The provision of a fund for this purpose by assessments and voluntary contributions was proposed but this plan was abandoned.

Development of technical and market research through an educational bureau of the institute was discussed by E. L. Lasier, vice-president, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., who reviewed some of the past cooperative efforts of the porcelain enamel industry, which finally resulted in the formation of the institute in 1930. During the past three years, he said, much had been accomplished by the institute along market and technical lines. After summarizing some of these achievements he suggested that these could constitute a foundation for a plan for carrying on the work of market and technical development on a more intensive and more highly organized scale. The porcelain enamel industry, Mr. Lasier pointed out, is encountering keen competition from other products, which include lacquers, electrolytic colored coatings on aluminum, low-temperature baking enamels, Monel metal and stainless steel, and to meet this competition strong cooperative efforts must be adopted. The competition of other products was also stressed by R. A. Weaver, Ferro Enamel Corpn., Cleveland, in discussing cooperative advertising as a basis for industry growth.

Discussing what the public does not know about porcelain enamel, William Hogenson, president, Chicago Vitreous Enamel Products Co., Cicero, Ill., declared that the public is not familiar with the advantages of porcelain enamel and that the industry so far has only scratched the surface in promotion and educational work. New large fields for porcelain enamel, he said, should be developed, as has been done in the stove industry and use of porcelain enamel for refrigerator cabinets should be extended. The advantages of porcelain enamel because of durability, beauty and cleanliness in comparison with the competitive products should be stressed and manufacturers and consumers should be taught to distinguish between porcelain enamel and other finishes. That only 20 per cent of refrigerators have porcelain enamel cabinets had previously been stated by Mr. Lasier in his paper.

A great increase in the use of porcelain enamel for building exteriors in the next few years was predicted by Bennett Chapple, vice-president, American Rolling Mill Co., Middletown, Ohio, in a paper on architectural use of porcelain enamel. There is a trend toward architectural expression through porcelain enamel, particularly among the younger architects, he declared. Various types of residential construction are under consideration for dwellings in various price classes. He showed several drawings of proposed residences ranging in cost up to $55,000 with outside coverings of porcelain enamel. Use of porcelain enamel in building construction, he said, had been held back by problems that had arisen in the method of attaching the enamel sections, but he believed these had been successfully solved. Referring to the growth of the enameling industry, he stated that during the years of the depression sales of enameling sheets had continued to increase.

Methods of attaching porcelain enamel units to buildings and panels showing new decorative possibilities of porcelain enamel for building interiors were shown in several exhibits.

Part of the time was devoted to a meeting of members of the porcelain enamel manufacturing industry, during which code matters were discussed.

Officers of the institute were reelected as follows: President, R. W. Staud, assistant to president, Benjamin Electric Mfg. Co., Des Plaines, Ill.; vice-presidents, Earle S. Smith, president, Toledo Porcelain Enamel Products Co., Toledo, Ohio, and F. E. Hodek, Jr., secretary, General Porcelain Enameling & Mfg. Co., Chicago; treasurer, William Hogenson, president, Chicago Vitreous Enamel Products Co., Cicero, Ill., and secretary, George MacKnight. An executive committee was chosen consisting of the officers and representatives chosen from the board of trustees of four divisions of the institute, these being: Louis Ingram, president, Ingram-Richardson Mfg. Co., Beaver Falls, Pa., jobbing shop division; George S. Blome, vice-president, Baltimore Enamel & Novelty Co., Baltimore, sign division; Edgar H. Weil, president, Vitreous Steel Products Co., Cleveland, and R. G. Calton, vice-president, Tennessee Enamel Mfg. Co., Nashville, table top division, and R. A. Weaver, president, Ferro Enamel Corpn., Cleveland, frit division.

New members of the board of trustees are: Jobbing shop division: R. F. White, executive vice-president, Mullins Mfg. Corpn., Salem, Ohio; Earle S. Smith; W. A. Donald, secretary-manager, Vitreous Enameling & Stamping Co., New York; William Mahoney, assistant general manager, Chattanooga Stamping & Enameling Co., Chattanooga, and Mr. Ingram. Sign division: F. S. Davidson, president, Davidson Enamel Products Co., Inc., Lima, Ohio; F. E. Hodek, Jr.; H. L. Beach, vice-president, Beach Enameling Co., Coshocton, Ohio; J. T. Penton, president, California Metal Enameling Co., Los Angeles, and Mr. Blome. Table top division: M. N. Hurd, Ingram-Richardson Mfg. Co., Frankfort, Ind.; W. H. Brett, secretary, Enamel Products Co., Cleveland; Edgar H. Weil, R. W. Staud and R. G. Calton. Frit division: W. R. Greer, vice-president,

Porcelain Enamel & Mfg. Co., Baltimore; G. K. Fry, vice-president, Enamelers Guild, Pittsburgh; William Hogenson; R. A. Weaver and Emery L. Lasier. Cooperative membership division: Bennett Chapple; R. D. Landrum, Harshaw Chemical Co., Chicago; F. A. Moeschl, vice-president, Newport Rolling Mill Co., Newport, Ky.; L. D. Mercer, assistant manager sheet sales, Republic Steel Corpn., Youngstown; and R. L. McGean, vice-president, McGean Chemical Co., Cleveland.

A code authority was named consisting of the officers with the exception of the secretary, the executive committee, and E. L. Lasier and H. H. Wineburgh, Textile, Inc., Dallas, Tex.

PWA Benefits to Metal-Working Group

WASHINGTON, May 22.—Orders placed for materials to be used on both Federal and non-Federal construction projects financed by PWA funds, as reported to the Bureau of Labor Statistics from Oct. 1, 1933, to March 31, 1934, have totaled $188,858,000. Important expenditures benefiting the metal-working industry have been as follows:

Aircraft (new)	$1,293,801
Airplane parts	2,402,695
Aluminum parts	13,339
Boat building	138,269
Bolts, nuts, washers, etc.	387,436
Cars, railway	22,672,511
Cast iron pipe and fittings	1,842,662
Copper products	55,968
Doors, shutters, window sash and frames, moldings, and metal trim	355,268
Electrical machinery and supplies	7,402,708
Engines and turbines	1,807,052
Fire arms	301,390
Forgings, iron and steel (not made in plants operated in connection with steel works or rolling mills)	1,476,269
Foundry and machine shop products, not elsewhere classified	8,611,168
Hardware, miscellaneous	661,015
Instruments, professional and scientific	690,368
Lighting equipment	517,492
Locomotives (steam)	2,587,995
Machine tools	1,516,182
Motor vehicles—passenger	63,612
Motor vehicles—trucks	276,315
Nails and spikes	114,555
Non-ferrous metal alloys, and products except aluminum	413,139
Plumbing supplies	1,097,782
Pumps and pumping equipment	1,263,148
Rail fastenings	629,658
Rails, steel	6,998,937
Refrigerators and refrigerator cabinets including mechanical refrig	170,800
Sheet metal work	748,448
Smelting and refining lead	21,492
Springs, steel except wire (not made in plants operated in connection with rolling mills)	202,268
Steam and hot water heating apparatus	1,348,449
Steel works and rolling mill products including structural and ornamental work	33,869,947
Switches—railway	357,894
Tools—other than machine tools	363,721
Wire drawn from purchased rods	1,447,358
Wire work not elsewhere classified	127,520

New York Receives Large PWA Allotment

WASHINGTON, May 22.—With release by the PWA of $37,558,000 of old allotments, New York is in a position to proceed with work on seven projects, the largest of which involves $23,000,000 for completion of subway construction. The other allotments are: new unit for Bellevue hospital, $3,830,000; incinerators, $4,000,000; Bayside high school, $2,500,000; completing water tunnel No. 2, $1,000,000; furnishing and equipping schools, $2,268,500, and improvements at Queens General hospital, $800,000.

Harold L. Ickes, public works administrator, has also signed contracts with two firms of architects in Atlanta, Ga., for services in connection with the construction of the housing projects in Atlanta, known as the Techwood project and the University project. The Techwood plan is for white persons of low income. The estimated cost of the construction of this project is $2,750,000. The University project is for negroes of low income and the cost of this construction will be $1,600,000.

International Conference On Steel Construction

ENGINEERS and builders from every important country of the world will gather in London, England, June 20 to 23, to discuss the most recent advances in building with steel. The preliminary program of this international meeting has just been released in the United States by the American Institute of Steel Construction. The London conference will be under the immediate supervision of the British Steelwork Association which will be joined by the members of similar organizations in Germany, France, Belgium, Holland, United States, Poland, and other steel producing countries.

Steel construction, as practised in the erection of buildings and bridges, has made considerable progress since the last international conference held in Duesseldorf, Germany, in 1933. The program of the meeting this June is so designed as to reflect that progress in its various factors.

Among the papers to be presented are the following:

Building Regulations on the Use of Steel, L. G. Rucquoi, Belgium.

Fireproofing of Steel Framed Structures, Van Genderen Stort, Holland.

Rigid Frame Construction, Maier Leibnitz, Germany.

The Ductility of Steel, Prof. G. Magnel, Belgium.

Factory and Other Utility Constructions, Prof. Ir. R. L. A. Schoemaker, Holland.

Full Scale Tests on Steel Framed Structures, Dr. F. J. Baker, Great Britain.

Steel Sheet Usage in Building Construction, Frank Main, United States of America.

Slum Clearance Schemes Employing Steel Frame Construction, France.

Working Class Flats at Rotterdam, T. Elshout, Holland.

The Architectural Use of Sheet Metal Products, F. Lorne, F.R.I.B.A., Great Britain.

Designs for Palais des Expositions, Paris, L. Icre, France.

Applications of Vierendeel Truss in Building Construction, P. C. Hausser, B.Sc., Great Britain.

Steel Pit Props and Mine Arches, Great Britain.

Welded Steel Frame Construction in Poland, Prof. Bryla, Poland.

The Application of Welding to Railway Rolling Stock, A. Brandt, Poland.

Types and Tendencies in Steel Bridge Design, T. C. Grisenthwaite, B.Sc., Great Britain.

Long Span Bridges, R. Freeman, Great Britain.

Bridge Competition To Close in June

AWARDS for the three most beautiful bridges built during the past year will be announced by the American Institute of Steel Construction next month. Those who wish to make entries in this competition will file photographs of bridges built in 1933 with the institute on or before June 1. The selections will be made by a jury composed of nationally known engineers and architects. From these entries will be selected the most beautiful monumental bridge, the bridge of medium size and the small span bridge. A stainless steel plaque commemorating the award will later be attached to the prize-winning bridges.

April Structural Bookings Higher

APRIL bookings and shipments of fabricated structural steel were the largest for any month since the beginning of 1933, according to the American Institute of Steel Construction, Inc. According to reports received from 66 per cent of the industry, April bookings were 20 per cent larger than the previous month, and shipments were 11 per cent larger. The bookings during April of this year were 125 per cent larger than for the same month last year.

Bookings ahead are approximately 50 per cent larger than at this time last year.

British Steel Group Changes Name

THE National Federation of Iron and Steel Manufacturers, London, England, will hereafter be known as the British Iron and Steel Federation. M. S. Birkett is secretary.

Scrap Industry Code Authority Approved

THE national code authority for the scrap iron and steel trade has been officially certified by the NRA, according to an announcement by Benjamin Schwartz, chairman of the code authority, who has received a communication to that effect from Division Administrator H. O. King.

The authority consists of the following: Darwin Luntz, Luntz Iron & Steel Co., Canton, Ohio, vice-chairman; Dan R. Cohen, D. R. & F. A. Cohen, Chicago, secretary-treasurer; P. W. Bowers, P. W. Bowers & Co., New York; Joseph V. Kiley, T. J. Kiley & Son, Boston; M. V. Bonomo, L. Schiavone & Bonomo Brothers, Jersey City; Dan Roblin, Buffalo Housewrecking & Salvage Co., Buffalo; Joel Claster, Luria Bros. & Co., Inc., Reading, Pa.; Ben P. Williams, Hickman, Williams & Co., St. Louis; Charles Dreifus, Charles Dreifus Co., Pittsburgh; Harry Goldberg, Goldberg Iron & Steel Co., Columbus, Ohio; David Feinburg, David Feinburg & Co., Medford, Mass.; Samuel Appel, Samuel Appel & Co., Fort Wayne, Ind.; Saul Brown, M. Brown & Son Co., Pittsburgh; Nathan Katz, Jacob Katz & Sons, Hartford, Conn., and M. Shapiro, Boston Iron & Metal Co., Baltimore.

Continental Steel Market Trend Mixed

HAMBURG, Germany, May 14 (*By Special Correspondence*). — The steel and machinery export markets on the Continent reflect mixed trends. Bars are neglected, only bright steel bars, rounds, squares and hexagons being in good demand. Russia, Japan and Great Britain are buying. Wire rods are moving well into Great Britain and other European countries, but the overseas business is dull. Prices are receding. Business in structural steel, particularly heavy girders, broad flange beams and angles, is improving and there are orders from many markets, though sellers complain that too many specifications are included for odd sizes.

Business in hot-rolled hoops was excellent in February and March, but during the second half of April showed a severe decline. The makers still have well filled order books and the industry is operating nearly at full capacity. Cold-rolled hoops are negelected, but bale ties are now feeling a certain animation. Steel tubes are quiet, only boiler tubes being somewhat more active, otherwise business is very dull. Steel plates of Thomas quality are selling in very small quantities, business being almost at a standstill. The business in medium thickness plates is not much better, and the black sheet trade is only showing some animation in the thick sections. Business in thin sheets is going to Great Britain. Demand for tin plate, however, continues to be rather satisfactory.

The machinery business is showing signs of an improvement. More orders are being received for metal working machinery, but business in other machine tools is still very dull.

Trade Slackening During May

SLACKENING in the rate of advance in production and trade was registered in April and the first half of May, with some basic fields of activity showing declines, according to the monthly report of the conference of statisticians in industry of the National Industrial Conference Board. Commodity prices weakened in April but strengthened in the first half of May, while security prices advanced irregularly in April but declined in the first two weeks of May.

Productive activity in general showed a net gain but declines of a more than seasonal nature in some lines became evident. Automobile production continued to increase in April and there is some indication that output in May will equal the April total. Building and engineering construction contract awards fell off sharply after a steep rise during the preceding month. Steel and iron production continued to expand contrary to seasonal trend. Electric power production declined seasonally in April. Bituminous coal production underwent a serious set-back, much larger than is seasonally usual in April. Textile apparel output also was measurably decreased.

Armco Reelects Directors

J. FRANK DRAKE, J. B. Doan, J. H. Frantz, Charles R. Hook, W. S. Horner, J. M. Hutton, F. H. Simpson, Paul Sturtevant, Calvin Verity and George M. Verity were reelected directors of the American Rolling Mill Co., at the annual meeting of stockholders held in the company's offices at Middletown, Ohio, May 17.

Mr. Hook, president, analyzed the company's business position with respect to sales and finance. He reported that during the first quarter of 1934 the company earned $545,269, with operations averaging 65 per cent of capacity. Production during the second quarter is continuing at approximately the same rate.

Several new developments, which may represent expanded markets for iron and steel sheets, were explained or displayed to the stockholders.

Britain's Largest Ore Crusher Completed

THE largest ore crusher ever constructed in the United Kingdom has just been completed by Hadfields, Sheffield, for the steel plant which is being erected by Stewarts & Lloyd's at Corby, England. It is of the roll type and weighs 145 tons. The rolls measure 6 ft. in diameter and 5 ft. in width, and, mounted on their shafts, weight nearly 34 tons each. Contrary to the usual practice, in this instance the machine is to be used as a primary crusher for further reduction. It is designed primarily to take blocks of iron ore as they come from the steam shovel as large as 54 in. by 48 in. by 36 in., but is capable of taking even larger pieces. The energy of the rotating rolls is such that, after the power has been shut off, it is sufficient to crush 20 or 30 tons of ore before the machine is brought to a standstill.

The renewable crushing roll shells are studded with conical teeth made of Hadura steel. In addition to the usual studs, one of the rolls has two rows of massive teeth, which break up the larger pieces of ore into small pieces that can be gripped by the normal teeth. The side frames constituting the hopper are of cast-iron, lined with cheek plates made of manganese steel. All the shaft bearings are completely flooded with oil when the machine is in motion, the oil being forced into the bearings by a pump worked by a small motor.

Ohio River Steel Shipments Up Sharply

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in April amounted to 72,974 net tons, compared with 47,897 tons in March, 4373 tons in February and 37,191 tons in April, 1933, according to the latest report of the United States Engineer Office, Pittsburgh. Total movements of steel products on the Monongahela River in April were 51,995 tons, compared with 40,685 tons in March, and 35,795 tons in April, 1933. Shipments of iron and steel on the Allegheny River last month totaled 5100 tons.

Foundry Equipment Orders Off in April

THE index of net orders for foundry equipment placed during April was 67.8 as shown by reports of 21 members of the Foundry Equipment Manufacturers' Association. This compares with 75.4 in March. Shipments were 55.5 as against 62.6 in the previous month. Unfilled orders April 30 were 63.0 as against 51.5 the month before.

Factory Employment Expands Further

A FURTHER expansion in factory employment and payrolls was recorded in April by the manufacturing establishments reporting to the Bureau of Labor Satistics of the United States Department of Labor. Between March 15 and April 15, employment increased by 1.9 per cent, and payrolls rose by 3.9 per cent.

These gains brought the Bureau of Labor Statistics' index of factory employment for April, 1934, up to 82.3, or to the level that prevailed in December, 1930. The April index of factory payrolls rose to 67.3, and marks the highest point recorded since June, 1931. These increases are particularly significant, because of the fact that employment and payrolls usually decline at this time of the year.

The index of factory employment in April was 37.4 per cent above the level of the same month in 1933, when the index was 59.9. The payroll index is 73.5 per cent above that of April of a year ago, when the index was 38.8.

The base used in computing these indices is the average for the three-year period, 1923-1925, which is taken as 100.

Propose Simplification of Steel Boilers

MANUFACTURERS, distributers, users, and others interested in steel horizontal fire box heating boilers have been invited to a general simplification conference by the division of simplified practice, Department of Commerce, which will be held at the Cleveland Hotel, Cleveland, at 10:00 a.m., June 5. The simplification and standardization committee of the Steel Heating Boiler Institute has submitted proposals and requested the division of simplified practice to call this meeting to develop a simplified practice recommendation.

Malleable Founders Name New Directors

THE MALLEABLE FOUNDERS' SOCIETY, Cleveland, elected directors for the fiscal year beginning June 1 at sectional meetings held during the past few days. The directors also constitute the code authority for the industry. Directors for the coming year are:

Western section: R. R. Fauntleroy, Moline Malleable Iron Co., St. Charles, Ill.; E. E. Griest, Chicago Railway Equipment Co., Chicago; F. S. O'Neil, Link-Belt Co., Indianapolis, and Brinton Welser, Chain Belt Co., Milwaukee.

Central section: R. N. Cole, Canton Malleable Iron Co., Canton, Ohio; C. C. Gibbs, National Malleable & Steel Castings Co., Cleveland; John C. Haswell, Dayton Malleable Iron Co., Dayton, Ohio, and A. F. Jackson, Michigan Malleable Iron Co., Detroit.

Eastern section: C. L. Berger, Eastern Malleable Iron Co., Naugatuck, Conn.; F. O. Parker, Acme Steel & Malleable Iron Works, Buffalo; H. L. Steeves, Rhode Island Malleable Iron Works, Hillsgrove, R. I., and P. R. VanDuyne, Meeker Foundry Co., Newark, N. J.

World Industrial Pace Continues to Rise

WORLD industrial production continued to increase in the first quarter of this year, according to the monthly statement on economic conditions in foreign countries made public by the National Industrial Conference Board. In Great Britain industrial production was higher than in any year since the World War boom. In Sweden the volume of production was larger than the average production in the good years 1925-1929. In Germany and Canada a sharp upturn from February to March brought industrial activity to the highest point since the recovery occurred. In Japan the rapid increase in production since the beginning of 1932 was stopped, but the volume remained near an all-time peak. In France the decline that occurred in the last part of 1933 was arrested. In the other gold standard countries—Switzerland, Belgium, the Netherlands, Italy, and Poland—production was stagnant, although the volume of business was well above the low point of the depression.

National Lock Case Recommended for Action

WASHINGTON, May 22.—The National Labor Board has recommended to NRA authorities that the "Blue Eagle" of the National Lock Co., Rockford, Ill., be withdrawn and that the case be referred to the Department of Justice for action.

This case originated in a complaint by employees organized in the "Federal Labor Union" who went on strike Aug. 31, 1933. The strike involved 900 men, about half of whom are still out. The case was first referred to the Chicago Regional Labor Board against which the company obtained an injunction.

The Labor Board charges that the National Lock Co. "has violated the right of employees to organize and bargain collectively through representatives of their own choosing."

McClouth Company to Operate in Early Fall

THE McCLOUTH STEEL CORPN., Detroit, which will manufacture hot-strip steel on a Steckel-type mill (as announced in THE IRON AGE of May 10, page 35), is a newly organized company of which Donald B. McClouth is president, Louis Moultane, vice-president and secretary, and L. H. McClouth, treasurer. These officers and principal stockholders are also the chief stockholders of the Consolidated Steel Corpn., which for the past eight years has done a steel jobbing business in Detroit, specializing in automobile body sheets.

Donald McClouth was the founder of the Consolidated company which was originally established at 8825 Conant Road, Detroit. About nine months ago the company acquired the property, including warehouse and pickling plant, of the defunct Federal Steel Corpn. at 300 Livernois Avenue, in the southwestern section of Detroit. The new hot-strip mill of the McClouth Steel Corpn. will be housed in connection with the Consolidated company, alterations now being made to the property for this purpose. It is expected that the new mill will be in operation in either August or September. No plans are contemplated at present for establishment of a cold-rolled strip mill as a companion of the hot-strip mill. Prior to the founding of the Consolidated Steel Corpn., Donald McClouth was in the steel brokerage business in Detroit.

Many Reserve Space For Metal Exposition

THE record of last year's National Metal Exposition held in Detroit has already been broken by advance purchases of exhibition space for the 1934 show, which will be held in the Port Authority Building in New York, Oct. 1 to 5. General distribution of the floor plans was started on May 15, and it is expected that the company displays will be both larger in number and size than in any year since 1929. Several societies will schedule technical programs.

Union Carbide & Carbon Corpn. has contracted for exhibit space at the Century of Progress and popular basic science demonstrations will include instructive portrayals of the uses of liquid air and electric furnaces, joining and cutting operations with an oxy-acetylene torch, and a history of the development of ferrous and non-ferrous alloys by the use of sound motion pictures. The "red hardness" demonstration of the non-ferrous Haynes Stellite alloy will also be included in the exhibit.

THIS WEEK IN WASHINGTON

Johnson and Darrow Cross Swords Over NRA

Iron and Steel Code in Forefront of Bitter Controversy Between NRA Head and National Recovery Review Board

By L. W. MOFFETT
Resident Washington Editor, THE IRON AGE

WASHINGTON, May 22.—Buttons off, foils flashing, steel is in the forefront in the sharp Johnson-Darrow battle of the NRA as reflected in the sizzling and voluminous reports of the National Recovery Administration and the National Recovery Review Board. Seldom, if ever, have more scorching documents gone to the White House.

Made public yesterday, they disclose a sharp conflict that was seen to be inevitable. General Hugh S. Johnson stoutly champions the economic system of private profit and competition as conceived by the NRA. Clarence Darrow, noted socialist, chairman of the review board, recommends the socialization of industry.

Set up to review NRA codes and offer suggestions for their improvement, the review board report through five of its six members blazes with fiery condemnation of the NRA and would tear it to pieces.

Angered at the review board report, General Johnson told the President that "a more superficial, intemperate and inaccurate document than the report, I have never seen." Going further, General Johnson declares that the review board is not acting in good faith, is clearly incapable of fulfilling its function of supplying fair and constructive criticism, and recommends to the President that the board be abolished forthwith. This means that the President must choose between Darrow and his board and General Johnson and the NRA, which is definitely taken to indicate the shelving of the Darrow board.

In all, five documents, aggregating some 320 mimeographed pages of some 70,000 words, were submitted to an over-worked President. However, as a means of saving the President's time, they are to be digested and analyzed by a committee of three designated by the President and consisting of General Johnson, Attorney-General Homer S. Cummings and Garland S. Ferguson, chairman of the Federal Commission, whose staffs, of course, will go over the reports.

Three reports came from the review board and two from the NRA. The chief report of the review board was signed by five of its members, Mr. Darrow, Fred P. Mann, Sr., W. W. Neal, Samuel C. Henry and William O. Thompson. It swings strongly to the left. Apparently not sufficiently bold in urging Government ownership of industry to please Mr. Darrow and Mr. Thompson, these two filed a supplemental report which declares outright for socialization. The other review board document is a minority report by the sixth member, John F. Sinclair, who chastised the majority members for not having approached the investigation from the point of view of careful research and analysis. Mr. Sinclair, however, shares the sympathy for "the little man" as expressed by the majority, condemns price fixing, limitation of production and "other factors of monopolistic control proved by the NRA," though his tone is much more moderate and thoughtful than that of the majority. The majority report was understood to have been actually written by Charles Edward Russell, well known socialist writer.

Johnson Urges Abolition of Board

The NRA documents consisted of reports prepared by General Counsel Donald R. Richberg, and Deputy and Assistant Deputy Administrators. The reports are prefaced by General Johnson's letter to the President urging abolition of the review board. The other document consists of one page of comment by General Johnson on the supplementary report of the review board. This supplementary report, General Johnson told the President, confirms Mr. Richberg's comment that the review board in its original report "was simply seeking to justify a preconceived opposition to the fundamental theories and purposes of the National Industrial Recovery Act." In his supplementary report, General Johnson pointed out that the way suggested to destroy the industrial recovery program is to transfer the powers of fact finding and enforcing "from the NRA to the Federal Trade Commission." The purpose of this recommendation is not to bring about enforcement of the codes or of the anti-trust laws, but, in the language of the supplementary report, "to inform the public as to the inherent difficulties" of the present economic order. It is thus proposed to prove to the public that competition

cannot be made "fair" by regulation and that it is necessary to establish industrial production "for use and not for profit."

General Johnson quoted the following from the board's supplementary report:

"The choice is between monopoly sustained by Government . . . and a planned economy which demands socialized ownership and control, since only by collective ownership can the inevitable conflict of separately owned units for the market be eliminated in favor of planned production. . . . The hope for the American people . . . lies in the planned use of America's resources following socialization."

Fascism or Communism?

Stripped of shadowy verbiage, General Johnson told the President, this means that the choice of the American people is between fascism and communism, neither of which can be espoused by anyone who believes in our democratic institutions of self-government; nor can any public official who has taken an oath to defend the constitution of the United States adopt or officially advocate such a program. The supplementary report, the General pointed out, demonstrated completely the propriety of his recommendation that the review board should be abolished.

Mr. Richberg assailed the board vigorously. He charged it with ignorance, bias, with reaching contradictory conclusions, the explanation of "which may be found in its selection of a noted socialist, who advocates complete Government control of business, to write a report for philosophic anarchists who apparently oppose any Government control of anybody, including criminals. The result is a report which on one page recommends a return of the law of the jungle and on the next page recommends that business be subjected to more detailed Government control." Mr. Richberg made reply to reports of the review board on "hearings" it held on eight codes, including steel, coal, motion pictures, etc., following which administrators in charge of the codes made detailed replies, the reply on the steel code having been made by Assistant Deputy Administrator R. W. Shannon, working under Division Administrator K. M. Simpson. Mr. Richberg followed the latter's reply with a rather detailed statement which answers both the Federal Trade Commission report and the report of the review board on the steel code. Both Mr. Shannon and Mr. Richberg dissected criticisms of the steel code, showed the many errors made by the critics, and, while not approving all details of the steel code, showed that it does stimulate competition and that it does not oppress small enterprise, about which the review board showed so much affected solicitude. The review board report on the steel code recommends scrapping of the entire code, except its labor provisions.

In his general report on the steel code, Mr. Richberg, who with Mr. Simpson, is the administration member on the code authority, said the review board report on the code is based largely upon the Federal Trade Commission report. He called attention to some of the typical mistakes of the board in its hasty review of a complicated and a highly technical industry, regarding which the members of the board had no previous knowledge and acquired no perceptible understanding.

Control of Code Authority

At the outset, Mr. Richberg pointed out, the board sought to prove a control by the code authority, the American Iron and Steel Institute, through voting arrangements, which, in the language of the board, "leaves the small enterprise at the mercy of the large." The utter inaccuracy of the facts and conclusions of the board concerning this comparatively simple matter, said Mr. Richberg, is shown by the calculation of the board that out of 15,000 votes 4362 would be cast by the United States Steel Corpn. As a matter of fact, Mr. Richberg explained, the total votes officially tabulated are 1332, of which the subsidiaries and affiliates of the United States Steel Corpn. cast 335. On the basis of the review board's calculation, it was stated, the invoiced value of the United States Steel Corpn. products would have been over $2,000,000,000, whereas for 1933 they were $167,500,000. Answering the charge of the review board that the board of directors of the steel institute administers the code in the interest of the larger companies in control of the institute, Mr. Richberg pointed out that on the institute board the representation of the United States Steel Corpn. is 13 per cent, although it is entitled to 25 per cent voting power. The representation of the Bethlehem Steel Co., he states, is 7 per cent, although entitled to 9 per cent voting power and the remaining 80 per cent of the membership is distributed among 21 compánies. Making reply to the claim of the review board of "many and bitter complaints from small enterprises," Mr. Richberg said there are 252 companies which are members of the code, including the great majority of all the small enterprises in the industry and the board does not report a complaint from one of them. As a matter of fact, Mr. Richberg pointed out, the small enterprises within the industry have deluged the NRA with protests against changing the code and with arguments in favor of its continuing operation.

Mr. Richberg concedes that the NRA has been critical from the beginning of the price provisions of the steel code, including the set-up of the basing point system, the inclusion of transportation charges in quoted prices, the waiting period of 10 days before prices are made effective and other provisions of the code which have been criticized by the Federal Trade Commission, "criticisms which are rehashed and garbled in the report of the review board. The board adds nothing whatsoever to the information available to the NRA and previously publicly discussed by the NRA concerning these provisions. But the board in its ignorance of the complicated operations of this industry has produced a certain amount of misinformation which will not help in working out an intelligent revision of the steel code in the public interest."

Mr. Richberg said there was no truth in the accusation that the code, in providing that prices shall not be effective until 10 days after filing "is tantamount to an agreement on the part of all members to adhere to the schedule of prices for at least a period of 10 days after the same are known." A price filed is not effective for 10 days, Mr. Richberg explained, but since another price may be filed the next day the first price may be only effective one day. As an example of the ignorance of the board, Mr. Richberg quoted Section 3 of Schedule 3 of the steel code to disprove the board report that the code authority may declare a price to be unfair during the 10-day waiting period and also the report that under the basing point system a member of the code cannot quote any price other than his own basing point price. Mr. Richberg showed that the provision he quoted permits any producer to quote not only the prices which he has filed for his own basing point, but also to quote the prices filed by any other producer at another basing point. Under this provision, Mr. Richberg points out, a member of the industry can meet a price made by his competitor in any part of the country. His competition, it is stated, depends solely upon his ability to meet the transportation costs of getting his products into the market.

There are many objections to the price provisions of the steel code which have been considered by the NRA, Mr. Richberg said, on the basis of accurate knowledge of those provisions and accurate reports concerning their operation. The review board, he declared, only muddied the waters by superficial criticism "based on a few days of casual study of a complicated industrial situation and upon an utter lack of adequate knowledge of the facts. The conclusions of such a report are worse than worthless and when expressed in the rhetorical language of the report are obvious appeals to passion and prejudice."

Stating that the NRA is giving an extended trial to the provisions of the steel code with continuing recommendations for their improvement, Mr. Richberg assailed the review

board for not giving NRA representatives an opportunity to furnish it with the vast amount of information available on the steel code. He said this information also was expressly omitted from consideration by the Federal Trade Commission. "A Government investigation and report of such a character," he declared, "simply makes a mockery of public service."

Darrow Charges Answered Individually By R. W. Shannon

MR. SHANNON took up specific criticisms of the steel code by the review board and answered them point by point. Mr. Shannon explained that, in speaking of the multiple basing point system, use by the board of the term "tributary" in such a phrase as "the basing point to which the customer's plant is tributary" is not precise and, therefore, cannot be commented upon generally, but he deals with the term in remarks upon individual points.

Taking up the charge that the code sanctions methods whereby competition in base prices is doubtless intended to be, and is, in practice, eliminated, Mr. Shannon said evidence that competition in base prices exists is shown by the lag in filings by members of the code. Often after the first member has filed an increased price on a product the last maker does not make a similar increase in as long as three months, creating price differences for the same product at the same basing point during such period. A definite example of this practice is cited.

It was then stated that in the first quarter of 1934, reports showed a combined deficit in net income after depreciation and fixed charges of $7,500,000 for 17 companies comprising the bulk of the industry, only five companies had actual net income, two of these being small. This was pointed to as showing that competition exists because the industry operated approximately 40 per cent of its ingot capacity during the first quarter of this year, which ordinarily is considered sufficient to permit profitable operations. Had it been true, as alleged by the review board, that there was no competition in base prices, the industry certainly could have earned a net income instead of the "very considerable net deficit shown."

Mr. Shannon declared to be incorrect the review board statement that all prices must be sent immediately throughout the country by the code authority, and explains that the only price notification sent to members of the code authority is that giving the "lowest base price at any basing points," without the names of the companies which have filed the lowest base price. All prices are open to inspection by industry members as well as consumers. Refuting another board statement, Mr. Shannon said there were numerous examples of variations in company filings existing over periods of from a week to three months.

The board referred to a Federal Trade Commission citation of alleged instances where members of the code have actually agreed upon base prices, and added that it was almost inevitable that such should have been the effect. This misses the point as to whether any member has been forced to name a price against his will, of which there is no evidence, and he explained that voluntary agreement is not prohibited.

Freedom in Naming Prices

The charge is made that there is limitation upon the producer's freedom to make base prices because of the authority given the directors of the institute to declare, after investigation, that any base price is an unfair price. Mr. Shannon said this charge does not take into account the fact that action by the board as to unfair prices requires a lengthy investigation into the cost of manufacture and a report to the President on the action taken. No such action has been taken, although Mr. Shannon said it might have been justified and referred to a specified case.

Fabricators Have Choice

The board charged that the code does not give a fabricator an opportunity to choose a better line of merchandise nor a chance to lower his material cost by buying from the concern which can supply it to him most advantageously. Mr. Shannon pointed out that in many cases quality competition is a strong force, and that the board's argument neglects the fact that the pressure of outside competition, in the long run, tends to lower the price in a particular area. For example, he said, if Pittsburgh mills could not compete in the Southeast at the prices charged currently by Birmingham mills without changing their Pittsburgh base prices, the Birmingham mills would set their prices just enough below Pittsburgh prices plus Pittsburgh freight into their territory to give them a slight advantage.

Competition Ruinous

It can be shown clearly, Mr. Shannon said in reply to the statement that competition is done away with, that price competition takes place under the multiple basing point system. Prior to the code, he said, it was of such a ruinous character as to result in net deficits for 37 companies, amounting to $6,301,000 in 1931; $147,917,000 in 1932 and $64,777,000 in 1933, during which time 14 automotive purchasers reported 1931 net income of $82,953,000; 1932 net deficit of $37,505,000 and 1933 net income of $79,260,000. Since the code, competition has been more or less stabilized and made long term, rather than sporadic, competition taking place at the time of filing of basing prices, rather than on individual sales. This point was dealt with at some length, and attention drawn to the fact that differentials on plates, bars and shapes have been reduced to $1 at Chicago over Pittsburgh.

Charge that the code is prejudicial to the interests of some small producers, who have efficient management, naturally advantageous location and good market facilities and who wish to develop volume elicited the following from Mr. Shannon:

"True. To considerable extent. For this very reason the code has benefited many small mills, as well as having retarded the creation of 'ghost' towns where inefficient units of either large or small enterprises would be closed down by the drastic price competition of the most efficient steel producers who can and were making prices so far below the average for the industry as to create the losses in the first quarter of this year. . . ."

Basing Point System Defended

Contrary to another claim of the board, Mr. Shannon said the basing point system encourages new mills, especially at non-basing points by affording the protection of the freight from basing points as an inducement to capital during the initial period. They later may become basing points when strong enough, for example, Chicago.

The board said new enterprises need to be able to make some price concession but that such concessions are penalized under the basing point system and hence small or new enterprise is seriously handicapped by the code in its local territory.

While secret price concessions may not be made, Mr. Shannon stated, there is nothing to prevent such a new enterprise from making as low a price as it desires, yet above reasonable cost of manufacture.

"Typical examples," said Mr. Shannon, "are the Automatic Products Co., Detroit, which has consistently main-

tained its base price on cold-finished steel bars $3 per ton below the prices of its large competitors, and the Rotary Electric Steel Co. which has maintained its price from $3 to $1 below those of its large competitors; both of these concerns being small new enterprises."

Youngstown Base Explained

The board cited a letter from five sheet producers in the Mahoning Valley, addressed to the commercial committee of the institute on Nov. 29, 1933, intended to show that the Youngstown district, the largest sheet producing district in the country, was a basing point before adoption of the code. Mr. Shannon called attention to the fact that the letter stated that "for more than 25 years flat-rolled steel has been sold to consumers at the Pittsburgh price f.o.b., Valley mill. Four or five years ago an arbitrary charge of five cents per 100 lb. was added to the mill price for delivery to any point in the district."

Both practices, Mr. Shannon stated, differ from that of Youngstown's being a basing point. He explained that Mahoning Valley consumers did not request a Youngstown base but a zone delivered price. The NRA is working on the matter, it was stated, in reply to the claim that to increase arbitrarily the price of Mahoning Valley consumers from $1.50 to $2.50 per ton without a similar increase in the price to their competitors would throttle the development of the Valleys and cause established industry to retire from business or to move to other districts.

The charge that the multiple basing point system for pig iron contemplates a cross-hauling of this product just as it was stated that steel products are cross-hauled, resulting in a higher level for pig iron than heretofore is met with the suggestion that producers would sell in other territories under any system, meeting prices, and "cross-hauling."

Mr. Shannon answered charges of discrimination against fabricators not located at basing points, saying that basing points being well known, there was no excuse for fabricators not selecting one. To the charge that a fabricator at Duluth, Minn., is being made to pay high prices for billets and bars, he said the NRA "is working on Duluth."

He said that under the basing point system, steel prices have declined ruinously. So-called "imaginary freight" is not detrimental to consumers when reasonably related to actual freight, because they average, just like parcel post rates, which are discriminatory. He also declared that the NRA is working on the matter of alleged discrimination against delivery by water and highway.

The board charged that the requirement that members of the code must obtain agreements from jobber customers that the latter will not, without approval of the code authority, resell at less than the price at which the code member might sell to "such a third party," is in the nature of resale price maintenance. This is not the case, Mr. Shannon said, because they are not retail prices, but mills' own wholesale prices. He said that no functional discount could be given without protection under code conditions.

"The differential by which Pittsburgh producers make lower prices than producers elsewhere operates to give Pittsburgh access to certain intermediate markets in which it has an advantage as contrasted with other centers," the board report stated.

"This, if true, is evidence of the genuine competition by Pittsburgh mills in a purely commercial way," Mr. Shannon replied. "Chicago and Birmingham will always try to get as high prices as they can and at the same time maintain the volume they desire."

NRA Attitude Toward Steel Code Outlined

THE National Recovery Administration has never recommended unqualified approval of the steel code and of the very practices criticized in the report of the Federal Trade Commission, which have been questioned from the beginning by representatives of the NRA.

This observation was made by Mr. Richberg in his conclusions commenting on the report of the commission. He pointed out that a trial period of the code was recommended by the NRA and approved by the President on the basis of a much broader view of the situation and a much more comprehensive consideration of all the pertinent facts than is evidenced in the limited investigation and vague conclusions of the commission.

Under the NRA, he stated, it has been sought to create an intimate and continuing supervision by the Federal Government over a process of industrial self-government and to correct unsound business practices through cooperative and persuasive methods so far as possible, and to resort to compulsions and prosecutions only when these were found necessary.

This policy, it was pointed out, has been pursued in seeking steadily to improve operations under the steel code. The NRA report upon the steel code, Mr. Richberg said, has been presented as a commentary on the commission report, "which was clearly written from another point of view which some may regard as well-seasoned and others may describe as threadbare."

Recommendations for improvement of the steel code offer a choice of public policy.

"Shall the policy of the NRA be continued and advanced, so that we may give an adequate trial to a program of Government cooperation in fostering the improvement of business and a lasting improvement of economic conditions—or shall we return to the older policy of limiting Governmental influence upon trade and industry to alternating sunshiny days of grants and special privilege and rainy days of prosecutions to compel a fair and free competition among business enterprises so endowed with power by law, and so protected by law in special privileges, that neither fair nor free competition can ever exist among them?"

Labor Provisions Deserve Attention

In his commentary on the commission report Mr. Richberg took the commission to task for disregarding study of labor provisions of the steel code and for not attempting to ascertain to what extent any price increases under the code reflected labor costs or other costs of production. He pointed out that these matters are fundamental since the code, reflecting the purposes of the recovery program, was intended to reduce unemployment, improve standards of labor and increase wage payments and the purchasing power of workers. Under the operations of the steel code, he said, these objectives have been achieved in the steel industry to a remarkable degree. By omitting these points the commission disregarded the direction of the Senate resolution, which prompted its report, for "full presentation of facts touching the industry since it went under the NRA code."

"Nor is it possible," said Mr. Richberg, "to consider the propriety of any price increases under the code without a careful study and determination of the extent to which such price increases reflect increased labor costs or other increased costs of production such as those resulting from increased costs of coal which may result in turn from increased wages in the bituminous coal industry. Other factors also—such as the fairness of previous prices—must be considered before any reliable judgment can be

expressed as to the reasonableness of higher prices."

Price Fixing First Consideration

The commission report, it was stated, was confined largely to a review of "the practice of the steel industry under the code with reference to price fixing," which study was directed, but was not made the only object of the investigation by the terms of the Senate resolution. Mr. Richberg offsets an impression of the commission report by saying that there has been no approval given "with relation to price fixing" or with regard to any "monopolistic practice or to any oppression of, or discrimination against, small enterprises."

To show that the code provides no machinery for fixing prices by a concert of action, Mr. Richberg explained that it did provide that the code authority, upon complaint, might determine that a price filed was an unfair price for the product "having regard to the cost of manufacturing such product" and gave the code authority the power, if a producer failed to file a fair base price, to fix such a price. But this power in the code authority, he stated, was regarded as one which could not be exercised contrary to the public interest, or as a "monopolistic practice," for two reasons. First, in the investigation of an unfair price the code authority had the power to require the producer complained of to furnish information concerning the cost of manufacturing the product in question. There have always existed such grave difficulties and such profound differences of opinion in determining the cost of manufacturing a particular product that it was evident that the code authority could hardly arrive at any determination of this question, acceptable either to members of the industry or to the NRA, except in a case of flagrant selling below cost. Second, any decision of the code authority attempting to fix a fair price must be filed with the President and, therefore, any exercise of this reserved power for the purpose of actual price fixing (as distinguished from preventing unfair price cutting) would impose an immediate and obvious obligation upon the President to require cancellation of such action or on default thereof to cancel his approval of the code.

Approval Withheld

Mr. Richberg said the NRA has neither approved nor condemned provisions for filing prices in accordance with the multiple basing point system and the 10-day waiting period before prices become effective, both of which were especially criticized by the commission. He explained arguments presented for and against these provisions. He said their legality had not been and could not be determined by the NRA when the code was presented and that they have been allowed to go into effect, subject to change. The NRA, Mr. Richberg said, was not advised by any administrative authority or by any decisions of the Supreme Court that the price provisions of the code were illegal. In fact, he said, official action and inaction indicated a contrary view.

The commission's cease and desist order of 1924 against subsidiaries of the United States Steel Corpn., requiring abandonment of the Pittsburgh-plus system, involved primarily a single arbitrary basing point, did not determine the legality of the multiple basing point system which has been operative throughout the steel industry since the commission order. It could not be assumed by the NRA that the multiple basing point system, which had been in operation for some nine years since the conclusion of the Pittsburgh-plus case, was illegal in the opinion of the commission. In fact, Mr. Richberg pointed out, the contrary assumption would be more logical, especially in view of the silence of the commission during hearings upon the proposed steel code.

Mr. Richberg said the NRA has never taken the position that any particular multiple basing point system is economically sound as a method of price quoting or legally justified. He said, however, that the NRA was required to observe that at least in two anti-trust prosecutions (Maple Flooring Manufacturers' Association and Cement Manufacturers' Protective Association cases), where basing point price systems were involved, the Supreme Court has not held that such a price system was illegal per se.

These conditions were recognized and the provisions have been allowed to operate, though meanwhile modifications are being continually suggested in the light of information and experience. Full information concerning them was offered by NRA to the commission to aid the latter in making a report which would comply fully, instead of only partially, with the Senate resolution.

"The aid of NRA was, however, utilized by the commission only in the gathering of the evidence to support its legal and economic preconceptions," Mr. Richberg commented. "The cooperation offered by the NRA in the formulation of its report was deliberately rejected. As a result of its evident assumption that its investigation should be a hostile proceeding the commission produced a report which was either intentionally or ignorantly so limited in scope as to discredit most unfairly the operation of the steel code as a whole by reporting only on its alleged demerits, and to discredit most unfairly the work of the NRA by ignoring its continuing and effective activity in protection of the public interest and by omitting any report whatsoever of the great public benefits and advance in the general welfare produced through the action of the NRA in bringing about the adoption of the steel code. It is difficult to understand how such a one-sided, unfair report could be prepared or approved by any public official having a sympathetic understanding of the objectives of the President's recovery program."

What Darrow Would Do to Steel Code

IF President Roosevelt should approve the recommendations of the National Recovery Review Board about the only remnants that would be left of the steel code would be its labor provisions. Here would be the effect of recommendations for "amendments" made by Mr. Darrow's board:

Bar institute's directors from declaring filed prices unfair (Article VIII).

Take from directors power to call for reports and statistics (Article IX).

Prevent directors from fixing liquidated damages (Article X).

Take from directors power of final interpretation of code (Article XI).

Call for only a two-thirds vote, if quorum is present, to amend code, instead of present 75 per cent of vote; would delete present provision for means of determining voting power by making 60 per cent of voting power rather than 75 per cent constitute quorum of code members (Article XII).

Delete trade practice rule giving directors power, with vote of three-fourths of its members, to declare unfair practices which are not listed; amend trade practice rule D by deleting "any material superior in quality to that specified by the purchaser," etc.; delete trade practice to prohibiting free service (Schedule H).

Eliminate provisions dealing with prices and terms of payment, except as applied to definition of "affiliated group" as shown by stock ownership (Schedule E).

Strike out provision prohibiting sales at prices other than those filed under terms of Schedule E (Article VII).

Delete provision for penalties and damages (Article X) for violating provisions of Article VII or Schedule E.

Abolish all basing points (Schedule F).

Delete provision regarding terms of discount for early payment (Schedule G).

Delete production control provision barring new blast furnace, converter and open-hearth capacity (Article V).

Probable Amendments to Steel Code Demanded

GENERAL JOHNSON has stated that he expects announcement some time this week of amendments decided upon for the steel code. They will be announced by Counsel Richberg, who, with Division Administrator K. M. Simpson is an administration member on the steel code authority. Mr. Richberg and Mr. Simpson have been in conference with steel executives regarding amendments to the code after May 31 and General Johnson said recently that only one

minor point remained to be agreed upon.

The changes to be made were indicated by Mr. Richberg in the course of his extended reply to the Federal Trade Commission and Darrow board reports on the steel code. He said that the NRA has recommended or will recommend (it is assumed in view of last week's conference they have been recommended) revisions of the code to improve the provisions affecting basing point price quotations, charges for transportation, price filing and administration along the following lines:

1. The basing points for price quotations should be determined according to the principle of providing a basing point for prices of all products, either at or within a short distance from the place of actual production of such products and in no instance outside the immediate area of their actual production.

2. Delivered prices, involving rail transportation, should include actual rail transportation from the basing point. If other forms of transportation are specified by a buyer only actual costs of delivery to the buyer should be charged—or a fair approximation of such costs if they cannot be precisely determined.

3. Special studies are in progress in the NRA and by other Government agencies for the purpose of determining policies to be made effective in drafting and revising provisions for price filing or price determination in codes of fair competition; and recommendations will be made prior to May 31, 1934, of a policy which should be applied to the steel code and which will be consistent with the conclusions resulting from these pending studies of this vital and difficult problem.

4. The constitution of the code authority and administration of the steel code should conform more closely to the general principles of code administration which have been developed out of the experiences of several months of code making that have followed the consideration of this pioneer code."

Conferences Being Held

The foregoing indicates important changes in expansion of basing points, in arriving at delivered costs, in doing away with the price lag and in code administration which have been discussed by steel executives both at Washington and at other conferences held with Mr. Richberg and Mr. Simpson. Those attending the recent Washington conference were: William A. Irvin, president, United States Steel Corpn.; E. G. Grace, president, Bethlehem Steel Co.; T. M. Girdler, chairman, Republic Steel Corpn.; L. E. Block, chairman, Inland Steel Co.; E. T. Weir, chairman, National Steel Corpn.; Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co.; W. J. Filbert, vice-chairman, United States Steel Corpn.; R. B. Halstead, counsel, United States Steel Corpn.; R. E. McMath, vice-president, Bethlehem Steel Corpn.; H. A. Moore, counsel, American Iron and Steel Institute, and Walter S. Tower, executive secretary, American Iron and Steel Institute.

Voting Power of Code Members

Voting power and percentage of the total for each individual member of steel code with 10 votes or more, together with a tabulation of the total votes for groups of companies having from one to eight votes per company are shown in the following table:

Company	Votes	Per Cent of Total
United States Steel Corpn.	325	25.7
Bethlehem Steel Corpn.	122	9.1
Republic Steel Corpn.	86	6.4
National Steel Corpn.	81	6
Jones & Laughlin Steel Corpn.	49	3.7
Wheeling Steel Corpn.	48	3,6
Youngstown Sheet & Tube Co.	46	3.4
American Rolling Mill Co.	45	3.4
Inland Steel Co.	27	2
Crucible Steel Co. of America	23	1.7
Corrigan - McKinney Steel Co.	21	1.6
McKeesport Tin Plate Co.	19	1.4
Spang, Chalfant & Co., Inc.	16	1.24
Allegheny Steel Co.	15	1.1
Pittsburgh Steel Co.	15	1.1
Colorado Fuel & Iron Co.	12	0.9
Otis Steel Co.	12	0.9
Sharon Steel Hoop Co.	12	0.9
Continental Steel Corpn.	11	0.9
John A. Roebling's Sons Co.	10	0.8
	1,005	75+

	Votes
Two companies with eight votes each	16
One company with seven votes	7
Three companies with six votes each	18
Six companies with five votes each	30
Twelve companies with four votes each	48
Nine companies with three votes each	27
18 companies with two votes each	36
145 companies with one vote each	145
	1,332

Steel Makers Not in Disagreement with NRA

WASHINGTON, May 22.—General Counsel Donald R. Richberg of the NRA this morning denied reports that revision of the steel code is being delayed because of disagreement with steel executives. He stated that the NRA was not ready to report an agreement but that negotiations are still underway and there is no disagreement. He declined to say what the revisions will be, although his reply to the Federal Trade Commission steel code report set forth what recommendations he said he had in mind.

Mr. Richberg also was asked if the revisions will have any effect on the strike threat of the Amalgamated Association of Sheet, Tin and Iron Workers, but refused to comment on the subject. General Johnson also was silent regarding the strike.

Employment Gains in Durable Goods Group

WASHINGTON, May 22.—Steel, automobiles and foundry and machine shop products reflected the most marked employment gains in April when compared with March, according to Secretary of Labor Frances Perkins. Stating that the factory employment index rose from 80.8 in March to 82.3 in April (1923-1925 =100), she announced that the payroll index rose from 64.8 to 67.3, and that the gains in factory employment and payrolls were confined almost entirely to the durable goods group of industries. The classification of the bureau of statistics, Department of Labor, includes, under durable goods industries, iron and steel, machinery, nonferrous metals, transportation equipment, railroad repair shops, lumber and stone-clay-glass. The totals of these groups showed an increase of 4.2 per cent in employment from March to April and an increase of 8.6 per cent in payrolls. Steel employment gained 3.7 per cent in April of this year over March and 50.9 per cent over April of last year, while payrolls rose 10.7 and 130.9 per cent respectively.

It was stated that the only decreases in employment in the 16 major industrial groups surveyed were in the anthracite and bituminous coal coal mining industries. These declines affected approximately 39,000 workers.

"Based upon the rise of the indices of the Bureau of Labor Statistics, it is estimated that more than 224,000 workers were returned to employment during April in the manufacturing and non-manufacturing industries," said Miss Perkins. "The increase in the combined weekly payroll is estimated to have been $7,700,000. In addition to these gains in private industry was an increase of 85,000 workers who found employment on projects financed with public works funds. There was also a gain of nearly 13,000 workers reported by the Interstate Commerce Commission for Class I railroads. Reports on agricultural employment indicate a seasonal increase in that field."

Russia has started construction of the largest aluminum works in Europe, which is called the Ural Aluminum Combine, and is located at Kamensk. The cost will exceed 200,000,000 rubles, and rich deposits of high grade bauxite at Kamensk will be utilized. A new magnesium plant at Kichkas is another part of the Soviet development program for its non-ferrous industry.

Steel Package Makers Code Approved—Other Codification Developments

WASHINGTON, May 22.—A code of fair competition for the steel package manufacturing industry, supplementary to the code for the fabricated metal products manufacturing and metal finishing and metal coating industry, has been approved. At the same time the clause providing for a waiting period between the date of filing and effective date of price lists was stayed. Sponsored by the Steel Package Manufacturers Institute, the code is to be administered by a code authority of five persons, four of whom will represent the members of the institute and one, those of the industry not members of the institute. The code will become effective May 26.

Plumbing Contractors Get Code

President Roosevelt has approved a supplemental code of fair competition for the plumbing contracting division of the construction industry. The code becomes effective June 4, and will regulate the activities of an industry which, in normal times, does an annual business of approximately $500,000,000 and employs some 150,000 persons.

In its lengthy section dealing with trade practices, the code prohibits among others: (1) the secret allowance of rebates or refunds; (2) the acceptance of any contract on a "fixed fee" basis or "cost plus" basis with an "upset price," protecting the purchaser against higher costs, but not protecting the contractor against losses, and (3) the knowing participation in "bid peddling" or "bid shopping."

Modification Hearings

Deputy Administrator Joseph Dilworth has announced that objections to the proposed 1934 schedules of budgets and contributions as filed by the following industries, for the support of their code authorities, would be considered by him if filed in writing in room 4036 of the Commerce Department.

The valve and fittings manufacturing industry schedule provides for a budget of $94,080.00. Contributions will be made on a basis of one-fourth of 1 per cent of the sales of the members of the industry based on a 12-month average derived from the sales of 1932 and the first six months of 1933.

The schedule filed by the canning and packing machinery and equipment industry provides for a $15,000.00 budget, contributions to be made on a basis of four mills per dollar of 1932 net sales.

The packaging machinery industry and trade schedule calls for a budget of $9850.00 contributions to be made on a basis of one mill per dollar of 1933 gross sales.

The printing equipment industry and trade schedule provides for a $40,000.00 budget, to be contributed on a basis of the number of employees. The amount per employee is to be determined by the code authority.

The schedule for the pipe nipple manufacturing industry calls for a $20,000 budget to be contributed on a basis of 1 per cent of the total volume of sales.

Hearing on proposed modifications to the metal tank code will be held by Deputy Administrator Joseph Dilworth May 24. The amendments would change the minimum wage and maximum hour provisions of the code to correspond with those contained in the approved code for the steel plate fabricating industry, would provide a system of contributions by members of the industry toward the support of the code authority and would permit the last named body to figure a scale for the lowest reasonable costs for the industry, below which its products could not be sold.

Amendments To Oxy-Acetylene Code

Hearing was held May 15 on 23 amendments proposed by the code authority and on a number of alternatives suggested by a dissenting group of manufacturers for inclusion in the approved code of fair competition for the oxy-acetylene industry. The suggested amendments and alternatives were formally presented to Assistant Deputy Administrator F. J. Patchell by John R. Gobey, representing the supervising agency charged with code administration.

Argument for approval of the suggested alternatives was directed by Lorn Campbell, Victor Equipment Co., San Francisco, and the Harris Calorific Co., Cleveland. Mr. Campbell charged that certain amendments proposed by the supervising agency would tend to create monopolistic practices with regard to the disposal of apparatus and equipment. Objection also was expressed by F. E. Huhllein, NRA Consumers' Advisory Board, to proposals which would give the supervising agency control over resale of products of the industry.

General Johnson has granted an additional 30 days to the Locomotive Institute, sponsors of the locomotive manufacturing industry's code, supplemental to the machinery and allied products code, in which to change bylaws to conform with the requirements of the N. I. R. A. This action was in conformity with that extension of time granted the other supplementary codes under the same basic code.

Administrator Johnson has approved the method of selection and recognized the personnel of code authorities for the following industries and the election of a substitute member of a seventh administrative agency to replace a member resigned:

Lime Industry, Dolomite Division—Chairman, A. W. Stauffer, J. E. Baker Co., York, Pa.; secretary, Daniel Baker, vice-president, Washington Building Lime Co., Baltimore; Bolton L. Corson, Cordol Corpn., Plymouth Meeting, Pa.; Samuel Eells, vice-president, Basic Dolomite, Inc., Cleveland; B. L. McNulty, president, Marblehead Lime Co., Chicago; Albert P. Meyer, president, Buckite Refractories Co., Pittsburgh; W. H. Moores, secretary, Moores Lime Co., Springfield, Ohio; G. J. Whalen, president and general manager, Kelley Island Lime & Transport Co., Cleveland, and B. P. Williams, president, Valley Dolomite Co., St. Louis.

Industrial Supplies and Machinery Distributers Trade—Chairman, William T. Todd, Somers, Fitler & Todd Co., Pittsburgh; vice-chairman, John L. Pitts, Brown-Roberts Hardware & Supply Co., Alexandria, La.; treasurer, Herbert Edge, Topping Bros., New York; B. H. Ackles, Rayl Co., Detroit; Charles E. Curtis, Western Iron Stores Co., Milwaukee; H. E. Ruhf, Cleveland Tool & Supply Co., Cleveland; Alvin M. Smith, Smith-Courtney Co., Richmond, Va.; and H. V. Waterman, Hendrie and Bolthorff Mfg. & Supply Co., Denver.

Packaging Machinery Industry and Trade—H. H. Leonard, Consolidated Packaging Machinery Corpn., Buffalo; W. D. Kimball, Standard Knapp Corpn., Long Island City, N. Y.; Roger L. Putnam, Package Machinery Corpn., Springfield, Mass.; Charles L. Barr, F. D. Reddington Co., Chicago; C. H. Lambelet, New Jersey Machine Corpn., Hoboken, N. J.; Otto Horix, Horix Mfg. Co., Pittsburgh; James G. Redner, Battle Creek, Wrapping Machine Co., Battle Creek, Mich.

Non-Ferrous Hot Water Tank Manufacturing Industry—Chairman, T. M. Bohen, Whitehead Metal Products Co., New York; vice-chairman, A. H. Trageser, John Trageser Steam Copper Works, Maspeth, N. Y.; Morris Feldman, John Wood Mfg. Co., Conshohocken, Pa.; Abe Cooper, Gerstein & Cooper Co., Soutn Boston, Mass., and A. C. Riordan, Enterprise Mfg. Co., Cambridge, Mass.

Industrial Safety Equipment Manufacturing Industry—T. A. Wilson, vice-president, Wilson Products, Inc., Reading, Pa.; I. W. Millard, vice-president, Industrial Gloves Corpn., Danville, Ill.; J. T. Ryan, vice-president, Mine Safety Appliances Co., Pittsburgh; George S. Shull, president, Safety First Supply Co., Pittsburgh, and Frederick Wahlert, president, Pulmosan Safety Equipment Corp., Brooklyn.

Steel Casting Industry—D. C. Bakewell, Duquesne Steel Foundry Division of Continental Roll & Steel Foundry Co., Pittsburgh; E. L. Brooks, Sawbrook Steel Casting Co., Cincinnati; E. H. Cornelius, Oklahoma Steel Casting Co., Tulsa, Okla.; J. W. Glover, Glover Machine Works, Marietta, Ohio; F. A. Lorenz, Jr., American Steel Foundries, Chicago; E. E. Noack, Monarch Foundry & Engineering Corpn., Ltd., Stockton, Cal.; Clarence Tolan, Jr., Dodge Steel Co., Philadelphia, and Keith Williams, Pratt & Letchworth Co., Buffalo.

Additional Codes Approved

Administrator Johnson has approved five codes of fair competition, four of them supplementary to the ap-

proved code for the fabricated metal products manufacturing and metal finishing and metal coating industry and the fifth a supplement to the approved code for the machinery and allied products industry. In each case, General Johnson stayed the action of a prescribed waiting period between the date of filing and effective date of price lists. As supplementary codes, all five adopt the minimum wage, maximum hour and standard labor clauses of the basic codes.

These codes are as follows:

The job galvanizing metal coating industry's code, sponsored by the National Galvanizers Association, effective May 27; washing machine parts manufacturing industry's code, sponsored by the Washing Machine Parts Manufacturers Council, effective on May 27; standard steel barrel and drum manufacturing industry's code, sponsored by the Steel Barrel Manufacturers Council, effective on May 26; galvanized ware manufacturing industry's code, sponsored by Galvanized Ware Manufacturers Council, effective May 27, and the water meter manufacturing industry's code, sponsored by the Water Meter Institute, effective May 27.

Iron Ore Code Proposed

A proposal for an iron ore code has come to the NRA from Alabama. The correspondence has been turned over to Divisional Administrator K. M. Simpson, who has charge of the steel code. No demand for an ore code has come from any district other than Alabama.

Gray Iron Code to Have Rehearing

Public hearing on proposed amendments to the approved code for the gray iron foundry industry and on an application for exception to certain of its provisions will be held by Deputy Administrator C. F. Craig on May 31, at the Raleigh Hotel. The code authority, in submitting amendments to provide for the cost of code administration, has submitted a budget to cover the period from Feb. 10, 1934, to Jan. 1, 1935, of $107,923.40 and proposes to accept contributions from members of the industry at the rate of one-quarter of two-tenths of one per cent of each member's net sales for the calendar year of 1933, which is equivalent to a quarterly assessment of 50 cents on each $1,000 of such net sales.

According to an administrative order, firms whose principal products are not governed by a code need not contribute to the support of that code. The code authority asks that an exception be made to this in their case as many of their firms could claim immunity from necessary contributions under this order.

Administrator Johnson has signed an order extending to 120 days the time limit within which the industries whose codes, supplementary to the master codes of the machinery and allied products industry, have not been approved, must choose their permanent code authorities. The basic code, as originally drawn, required the supplementary industries to pick their code authorities within 60 days after March 28, 1934, the effective date of the code. In view of the numerous delays which have occurred in securing approval for many of the codes, General Johnson's order grants them another 60 days.

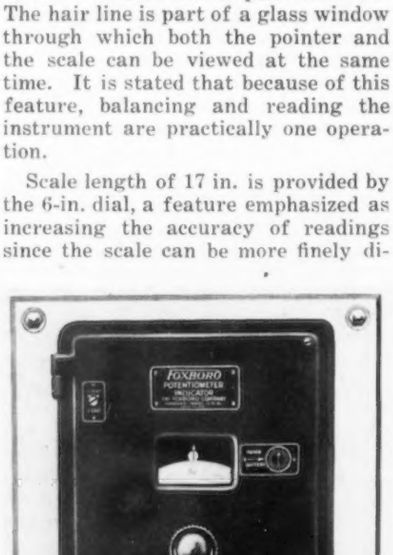
Division Administrator A. R. Glancy has approved the election of J. M. Keller, manager, American Car & Foundry Co., St. Louis, as a member of the code authority for the chilled car wheel industry to take the place of C. A. Liddle, resigned.

Indicating Pyrometer Adjusted Conveniently

A NEW indicating potentiometer pyromter featuring central location of all adjustments on the front cover plate, making the instrument more convenient to use, has been announced by the Foxboro Co., Foxboro, Mass.

The pointer of the galvanometer swings just above the temperature dial and is brought to balance at the same hair line index which marks the measurement on the temperature scale. The hair line is part of a glass window through which both the pointer and the scale can be viewed at the same time. It is stated that because of this feature, balancing and reading the instrument are practically one operation.

Scale length of 17 in. is provided by the 6-in. dial, a feature emphasized as increasing the accuracy of readings since the scale can be more finely divided. Plain black figures add to the readability.



The galvanometer has been designed to provide the ruggedness essential for industrial use, but without sacrifice of accuracy or sensitivity. It has the double suspension similar to the galvanometer used in the company's potentiometer control pyrometers.

The universal, moisture-proof case is of new design. It may be either surface or flush mounted. When flush mounted, a clamping device holds the instrument tight to the panel without screws or bolts extending through. Thermocouple leads are brought to a connection compartment, sealed from the interior of the case, and with openings for introduction of conduit if desired.

By the use of a selector switch, the indicator can be used to give temperature readings from any number of thermocouples located at widely scattered points. Multiple-point rotary selector switches of simple design may be used to connect any number of thermocouples to the indicator. These switches may be furnished for flush panel mounting as shown in the illustration.

A NEW two-reel motion picture showing repair, reclamation and production application of oxy-acetylene welding and cutting has been made available by the Internaltional Acetylene Association, 30 East Forty-second Street, New York, for technical society meetings, engineering colleges, technical and other schools, foremen club meetings and similar gatherings. The film can be shown on standard portable 16 mm. projectors, and the subject requires approximately 25 min. for showing. Arrangements to borrow the film, which is entitled "The Prosperity Process," can be made through the secretary of the association. The specific date together with an alternate date should be given.

Printed copies of the revised simplified practice recommendation, R67-33, covering taper roller bearings, are now available, and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 5c. each, according to an announcement of the division of simplified practice of the National Bureau of Standards.

This simplified practice recommendation was originally formulated by the industry in 1927. The current revision not only brings the program into accord with the Society of Automotive Engineers' revised standard, but extends the scope of the original recommendation to include larger bearings together with certain steep angle bearings for naval and general use.

... PERSONALS ...

S. R. RECTANUS has asked to be relieved of his duties as vice-president in charge of operations of the American Rolling Mill Co., according to an announcement by CHARLES R. HOOK, Armco's president. He will establish himself as consultant on management problems, especially those pertaining to organization and industrial relations. For several weeks he has been in Washington in the interests of the Durable Goods Industries Committee in its studies of the recovery program and in the preparation of a report being made to President Roosevelt at the request of General Johnson. He has consented to remain at the Mayflower Hotel in Washington for the present in connection with the activities of the sub-committee on industrial relations, of which Mr. Hook is chairman. Upon his return to Middletown, Mr. Rectanus will complete a number of special assignments at Armco before devoting all of his time to his consulting practice.

Entering the employ of the American Rolling Mill Co. in 1909 as a laborer in the galvanizing department, immediately after his graduation from Purdue University, Mr. Rectanus rose to the position of superintendent and in 1916 was made director of personal relations, specializing in organization and industrial relations. When Armco began construction of the continuous sheet mill in Ashland, Ky., in 1923, he became assistant manager of the Ashland division, and later works manager. After a year as assistant to the general manager of Armco, he was elected vice-president in charge of operations on Jan. 1, 1930, making his headquarters in Middletown, Ohio. Mr. Rectanus is a director of the American Management Association, a member of the American Iron and Steel Institute and numerous other technical and industrial organizations.

❖ ❖ ❖

NORMAN E. WOLDMAN, formerly metallurgical engineer for the Westinghouse Electric & Mfg. Co., has opened his own consulting chemical and metallurgical laboratory at 10,616 Euclid Avenue, Cleveland, under the name of Crystal Engineering Laboratories. Dr. Woldman has taught chemistry and metallurgy at the University of Maine and the University of Illinois.

❖ ❖ ❖

A. H. LILLENGREN has been appointed purchasing agent of the Great Northern Railway Co., St. Paul.

❖ ❖ ❖

W. R. CHAMBERS, formerly chief engineer of the General Steel Castings Corpn. in charge of design and construction and starting of the Eddystone, Pa., plant, has been appointed to the engineering staff of the general engineering and geology division of the TVA. He was at one time assistant chief engineer of the American Steel Foundries on plant and special engineering.

S. R. RECTANUS

❖ ❖ ❖

JOSEPH G. SHRYOCK, chief engineer of the Belmont Iron Works, Philadelphia, has been awarded the certificate of merit by the Franklin Institute "for his ingenious combination of standard, structural shapes in the formation of a light bridge floor."

❖ ❖ ❖

R. V. OLSON, who for the past several years has been secretary and sales manager of the Mossberg Pressed Steel Corpn., Attleboro, Mass., has been elected vice-president and sales manager.

❖ ❖ ❖

DAVID P. WILLIAMS has been elected vice-president of the Vulcan Mold & Iron Co., Latrobe, Pa. He has been identified with the company with the exception of several years since his graduation from Yale University in 1925. His father, the late Col. E. H. Williams, was founder and formerly president, and his brother, Edward R. Williams, is now president.

❖ ❖ ❖

WILLIAM LLOYD, formerly president of the Coxe Stoker Engineering Co., which subsequently was affiliated with the Combustion Engineering Corpn., New York, has again become associated with the engineering department of the Combustion Engineering Co.

❖ ❖ ❖

A. V. GRUBER, formerly of the Metals Coating Co. of America, Philadelphia, now heads the Molten Metallizing Corpn., Thirteenth and Grand Streets, Hoboken, N. J.

B. J. CROSS, who from 1921 to 1931 was associated with the engineering activities of Combustion Engineering Corpn., New York, has rejoined the engineering department of the present organization, Combustion Engineering Co., Inc. He will be engaged in development and research work under the direction of JOHN VAN BRUNT, vice-president in charge of engineering, and of HENRY KREISINGER.

❖ ❖ ❖

CHESTER K. BROOKS, secretary-treasurer, Stewart Furnace Co., Cleveland, has been elected a director of the Youngstown Sheet & Tube Co.

❖ ❖ ❖

WILLIAM J. CLUCAS has been appointed assistant manager of sales of the Rotary Electric Steel Co., Detroit. For the past eight years he has been district manager of sales at Detroit for the Columbia Steel & Shafting Co., Pittsburgh. Prior to his association with the Columbia company he was western sales manager for the Lancaster Steel Products Corpn., Lancaster, Pa., which was acquired by General Motors Corpn.

❖ ❖ ❖

J. W. FRIDLEY, president, Cleveland Cap Screw Co., Cleveland, was elected president of the United States Cap Screw Service Bureau at its recent annual meeting. W. H. HILL, Scovill Mfg. Co., Waterbury, Conn., was elected vice-president. A new executive committee was named consisting of R. M. HEAMES, Victor-Peninsula Co., Detroit; H. E. PENFIELD, president, Standard Screw Co., Chicago, and H. D. NORTH, president, Ferry Cap & Set Screw Co., Cleveland.

❖ ❖ ❖

F. JOERGER and G. PEELSTICK, prominent industrialists of Mannheim, Germany, last week made a brief visit to the Allis-Chalmers Mfg. Co. and several other leading Milwaukee industries, accompanied by G. A. RENTSCHLER, JR., president, General Machinery Corpn., Hamilton, Ohio, and several other Ohio machine concerns.

❖ ❖ ❖

DEANE S. HOLT, of Paris, France, European representative of the Harnischfeger Corpn., Milwaukee, has returned to headquarters of the company after an interval of four years. The time of his return to Europe is as yet indefinite.

❖ ❖ ❖

CHARLES T. SCANNELL has been appointed general manufacturing manager of the Buick Motor Co., Flint, Mich., division of General Motors Corpn., succeeding GEORGE T. CHRISTOPHER, resigned, who had held the position since April, 1932. Mr. Scannell took his apprentice work as a machinist in Little Falls, N. Y., and worked in Schenectady for a short time before joining the Weston-Mott Co. in 1906 at its Utica, N. Y., plant.

When Weston-Mott moved its operations to Flint the following year, Mr. Scannell was placed in charge of the lathe department. A short time later he became superviser of all the Mott factories which became part of the Buick Motor Co. More than 10 years ago he was appointed superintendent and then factory manager of factory No. 11, which is the Buick Motor plant.

❖ ❖ ❖

M. M. GILMAN has been made vice-president and general manager of the Packard Motor Car Co., Detroit. For the past two years he has been vice-president in charge of distribution. He has been engaged in the automobile business since his student days at the University of Michigan and has been with the Packard company since 1918. He assumes his position as one of the important executives of the automobile industry at the age of 45.

❖ ❖ ❖

L. A. SHEA, who has been in charge of the electrical department of the Hevi Duty Electric Co., Milwaukee, has been appointed district representative for Ohio, with offices at 5005 Euclid Avenue, Cleveland. He will have charge of the company's service and sales agency on electric heat-treating furnaces.

❖ ❖ ❖

HARRY L. MEYERS has been appointed assistant works manager of the West Leechburg Steel Co., West Leechburg, Pa. He has been associated with the company for 19 years, and was formerly night superintendent, and most recently hot mill superintendent. R. C. GRAY, who has been connected with the company for 25 years, has been promoted from the position of night superintendent to that of superintendent of the hot mills. IRVINE SHOFF, formerly chief inspector, has been appointed night superintendent. ELBY COY, formerly assistant cold mill superintendent, has been made chief inspector.

❖ ❖ ❖

A. F. KING, formerly with the Buffalo and Philadelphia district sales offices of the Reading Iron Co., has been transferred to Boston as district sales representative, with headquarters in Boston. JOHN G. ROSS, for many years district sales representative in Boston, has resigned to accept a position elsewhere.

❖ ❖ ❖

WILLIAM SOHERR has been appointed New England district manager of the Patterson Foundry & Machine Company, East Liverpool, Ohio. His headquarters will be in Boston. Mr. Soherr is a graduate of the Institute of Technology, Darmstadt, Germany, and a member of the American Chemical Society.

❖ ❖ ❖

GEORGE H. CHARLS, formerly assistant to the president and secretary of the American Iron and Steel Institute, has been appointed administration member of the sandstone industry code authority.

❖ ❖ ❖

GEORGE PILLING, who was identified with Pilling & Co., Philadelphia, from 1923 to 1931, has been made administration member of the code authority of the refractories industry.

❖ ❖ ❖

GEORGE H. STORAR, formerly of the Burger Iron Co., Dayton, Ohio, has become general manager of the Dayton Fabricated Steel Co. He was at one time connected in an executive capacity with the American Bridge Co., McClintic-Marshall Co. and other fabricating companies.

❖ ❖ ❖

E. A. HERR, heretofore identified with the purchasing department of the Frigidaire division of the General Motors Corpn., has been appointed purchasing agent by Servel, Inc., Evansville, Ind.

OBITUARY

TAYLOR ALLDERDICE

TAYLOR ALLDERDICE, formerly president of the National Tube Co., Pittsburgh, died at his home there on May 20, aged 71 years. Prior to his resignation in December, 1928, he had held the presidency of that company since April, 1926, following the retirement of William B. Schiller, having served as vice-president in charge of operations since 1902. He became identified with the steel industry in 1881 with the old Pittsburgh Bessemer Steel Co., Ltd., Homestead, Pa., which was later absorbed by Carnegie, Phipps & Co., Ltd., and was the nucleus of the present Homestead works of the Carnegie Steel Co. He continued this association until 1892, when, after spending a short time with the Pottsville Iron & Steel Co., Pottsville, Pa., he became associated with the National Tube Works Co. at McKeesport, Pa., in charge of the erection and operation of the new Bessemer steel works of the Monongahela Furnace Co. which had just been acquired by the National company. Since his retirement from active business, Mr. Allderdice had devoted a good deal of his time to the Carnegie Institute of Technology and the Carnegie Institute, of which he had served as trustee for many years. He was a director of the American Petroleum Institute, Pittsburgh Screw & Bolt Corpn., and several other companies.

❖ ❖ ❖

JAMES R. SMITH, who for 20 years had been sales manager of the Taylor-Wharton Iron & Steel Co., Philadelphia, died on May 20 at his home at Pittsburgh. He was 51 years of age.

❖ ❖ ❖

OLIVER H. P. CHAMPLIN, founder and formerly president of the Strong Steel Foundry Co., Buffalo, died at his home in that city on May 12, aged 69 years. He was active in the business until 1928. Mr. Champlin was secretary of the company at the time of his death.

❖ ❖ ❖

THOMAS J. GILLESPIE, for over 40 years traffic manager of the East Jersey Pipe Co., New York, died on May 13.

❖ ❖ ❖

FRANK W. ADAMS, JR., representative in the Dayton territory for the Ex-Cello-O Aircraft & Tool Corpn., Detroit, died at his home in Dayton on April 21.

❖ ❖ ❖

ADOLPHE S. DEUTSCH, president, Monarch Aluminum Ware Co., Cleveland, died April 26 in Rochester, N. Y., where he had lived for several years. He was 81 years of age. Mr. Deutsch established the metal products firm of A. S. Deutsch & Co., Cleveland, which was succeeded by the Monarch Brass Co., manufacturer of plumbers' brass goods and this company later was succeeded by the Republic Brass Co. and still later by the Monarch Aluminum Ware Co.

❖ ❖ ❖

R. K. RANDALL, president, Cleveland School of Welding, Cleveland, died April 24, aged 44 years. He was formerly chairman of the Cleveland section of the American Welding Society and was a member of the Cleveland Engineering Society.

❖ ❖ ❖

EDWARD MAHLER, for 33 years purchasing agent for the Boston Elevated Railway, died suddenly on May 17, at his home in Brookline, Mass. Prior to his association with the Boston company he was associated with the Long Island Railroad, the Elmira, Courtland & Northern Railroad, the Philadelphia & Reading and the New Haven railroads respectively. He was a native of Brooklyn.

Expansion Noted in British Steel Activity

LONDON, ENGLAND, May 22 (*By Cable*).—Recent expansions made in British pig iron producing capacity have been insufficient to meet the increased demand and additional furnaces will be relighted. Steel demand is very lively with heavy buying of semi-finished and construction steel in better demand. There is also a considerable domestic demand for railway material.

The Government has decided to continue indefinitely the steel import duties which were to expire in October. British chambers of commerce have called a meeting to consider the position of dealers under the proposed reorganization of the iron and steel industry and to urge the Government to protect their interests.

Steel Industries of Great Britain, which owns a controlling interest in United Steel Companies, has accepted, subject to stockholders' approval, the offer from an important London financial group to purchase a large block of the company's shares with option on the balance. Voluntary liquidation of Steel Industries of Great Britain is proposed.

Tin plate makers report satisfactory bookings and expect good order books for the next few months, with fair inquiries from at home and abroad.

Welsh tin plate makers have agreed to extend the pooling scheme after September and for as long as international agreements operate. Negotiations regarding international agreements are proceeding satisfactorily.

Continental iron and steel is quiet being affected by labor troubles in Belgium, as well as by United Kingdom import duties. United Kingdom is placing fair orders for wire rods and the Far East is buying sheets.

United Kingdom exports of pig iron for April were 13,871 tons, of which 50 tons were shipped to the U. S. Total iron and steel exports were 165,164 tons.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9			
Billets, open-hrth.	£5	10s.	to £5	15s.
Tin plate, per base box		17s.	3d. to 17s.	9d.
Steel bars, open-hearth	£7	17½s.		
Beams, open-hrth.	£7	7½s.		
Channels, open-hearth	£7	12½s.		
Angles, open-hearth	£7	7½s.		
Black sheets, No. 24 gage	£9	5s.		
Galvanized sheets, No. 24 gage	£11	5s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2	7s.	
Wire rods, No. 5 B.W.G.	£4	10s.	
Steel bars, merchant	£3	5s.	
Sheet bars	£2	8s.	
Plates, ¼ in. and up	£4		
Plates, 3/16 in. and 5 mm	£4	2s.	6d.
Sheets, ⅛ in.	£4	7s.	6d.
Beams, Thomas	£3	1s.	6d.
Angles (Basic)	£3	2s.	6d.
Hoops and strip base	£4	2s.	6d.
Wire, plain, No. 8	£5	7s.	6d.
Wire nails	£5	15s.	
Wire, barbed, 4-pt. No. 10 B.W.G.	£8	15s.	

Grinders for Piston And Other Pin Holes

PIN hole grinders complete with motor drive and four roughing and four finishing mandrels are being offered by Sunnen Products Co., 7900 Manchester Avenue, St. Louis, Mo. These grinders rough out and finish holes in pistons, rods, spindle bolts, sector housings, cluster gears and the like.

The design is such that both hands of the operator are free to handle the work which cannot be jerked from the operator's hands. Mandrels can be changed from roughing to finishing or to a different size in 30 sec. The stone in a mandrel is quickly expanded by turning a knurled adjustment nut on the hub of the driven pulley. Run-in fits, free from high spots and without bell-mouth are obtained with perfect alignment of bosses. Power is controlled by a foot treadle. Mandrel sizes range from 0.720 in. to 1.100 in.

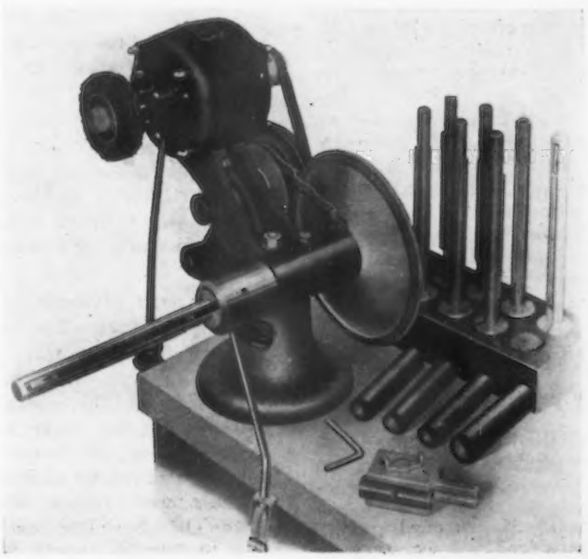
Future Trend in Alloy Metallurgy

AT a meeting of New York metallurgists and heat treaters recently, a well-known member of the fraternity made this statement:

"The future trend in alloy metallurgy is the attainment of the highest strength with a minimum of alloy additions and of heat treatment, or the elimination of heat treatment combined with a balancing of the alloy controls"—or words to this effect.

Undoubtedly there is much truth in this assertion. The trend in materials is decidedly toward alloy steels. But one argument against these steels, particularly the high-alloy, as thus far developed, is the cost. Almost any specifications and industrial conditions can be met by such steels, especially after proper heat treatment, which also adds to the expense. Nearly all of the alloy steels require heat treatment to bring out their highest qualities.

Manifestly, if low-alloy steels, the simpler the better, can be perfected which shall require no heat treatment or at least only a little, such as normalizing, the demand and use for them will expand into large tonnages. The engineering trend for light weight combined with adequate strength is strong, and will gain in momentum as new designs in equipment and structures appear. Already there are several low-alloy steels which may be classed in the category mentioned; for example, a chromium-silicon-manganese steel which has many excellent properties, among which are high physical properties, even in the untreated condition.



Strike Fever and Labor Board's Bias Disturb Steel Industry

THE labor pot keeps boiling so far as the iron and steel industry is concerned. What with an iron strike still in effect in the South and another threatening in the Lake Superior region, nation-wide demands by the Amalgamated Association of Iron, Steel and Tin Workers, and the recent action of the National Labor Board in ordering that an election be held at the Duquesne, Pa., plant of the Carnegie Steel Co., to determine the form of employee representation.

The Labor Board decision, although not entirely unexpected, came as a jolt to the industry. It had been known that informal negotiations had been under way between the company and the board regarding the alleged dissatisfaction of employees with industrial relations within the plant. It was argued that any doubt as to the character of employee representation in the plant could be dispelled in the coming regular June election of the representation plan under which anyone, employee or non-employee, is eligible for election. However, the labor board, so far as is known, neither investigated the validity of the February election which resulted in the adoption of the present representation plan, nor the validity of the petition, containing 1500 signatures, which embodied the complaint filed with it last December by employees affiliated with the Amalgamated Association of Iron, Steel and Tin Workers.

The issuance of the order, of course, brought to an end the informal negotiations which had been going on between the company and the board. The board's attitude in this case is consistent with its record in other labor disputes and has further reinforced the conviction of industry that it is a biased tribunal. The rising tide of opposition to the labor board as now constituted is having its effect on Washington. Proposed changes in the Wagner bill are now being considered by the Senate committee on education and labor and it is generally understood that the proponents and the opponents of the bill realize that they are dealing with a highly controversial subject and are therefore reluctant to allow the measure to reach the floor of the Senate.

Columbia River Project Is Coast Highlight

SAN FRANCISCO, May 21.—Preliminary estimates on tonnages for the Bonneville power house substructure and navigation lock, to be located east of Portland, Ore., on the Columbia River, have added to the interest in major Federal construction in the Northwest. These two units of the Bonneville project will require approximately 10,400 tons of reinforcing bars, 1650 tons of structural steel, 250 tons of corrosion-resisting steel and 100 tons of anchor bars. A call for bids is expected about June 1. General Construction Co. and Gilpin Construction Co. were awarded the general contract for the State bridge over Yaquina Bay. The award of the 2065 tons of structural steel and 1125 tons of reinforcing bars has not yet been reported, although Moore Drydock Co. was low bidder on one unit involving a major part of the tonnage.

Mills report little change in production rates during the week, with a favorable movement of all products. Scrap purchases are constant, with no outstanding tonnages placed. Pig iron and ingot production continues with substantial gains over the corresponding period in 1933. Warehousemen report that business has shown a slight improvement over the first quarter.

Outstanding among new inquiries are calls for bids at Los Angeles on 3750 tons of cast iron pipe and at Oakland on 1500 tons of plates for a pipe line. The Oakland tunnel, for which bids are to be taken this week, is holding the local attention. Approximately 700 tons of structural steel and 500 tons of bars will be required in the tunnel and the two ventilating buildings. Among the awards reported, which totaled less than for any week of the quarter, was 544 tons of shapes for a storehouse extension at the Navy Base at Pearl Harbor, T. H. At Los Angeles the Southwest Welding Co. booked 500 tons of plates for brewery tanks.

Heat Consumption of Open-Hearth Furnaces

(Concluded from Page 31)

of minor changes retains its original shape. The hearth is 32 ft. 8 in. long and 15 ft. 10½ in. wide, giving a hearth area of 519 sq. ft. From the door sill to arch, it is 4 ft., from bottom to door sill 3 ft. 3 in., and from bottom to roof of furnace 9 ft.

The regeneration chambers are 27 ft. 4½ in. long and 18 ft. 6 in. deep. The chambers were originally built when producer gas was used as fuel and hence are divided into two chambers, the outside chamber being 8 ft. in width and the inside 5 ft. 6 in. The checkers are of the vertical flue type with a height of 12 ft. 3 in. from top of rider walls to top of checker work, No. 2 fire-clay brick 3 x 6 x 15 in. being laid with 6-in. openings up to within 3 ft. of the top, where six courses of silica brick 3 x 6 x 15 in. complete with checker work. The total heating surface is 12,672 sq. ft. Flue dirt which is deposited by the waste gases is blown from the checkers periodically by means of a steam jet.

Coke oven gas and tar or oil was used as the fuel. The coke oven gas burners, four in number, and of the aspirating type, are located one on each side of the ports, while the water-cooled tar burners are located in the ends of the furnace. The customary method of charging and operating the furnace was followed. After the preceding heat, the bottom and banks were made up with raw and calcined dolomite; and the limestone, ore and scrap were charged in the order given. After the scrap was almost melted down, the cold pig was charged. Heats melted were worked in the customary manner. Reversals of the furnace were made every 15 min. The temperature of the furnace throughout the heat was controlled by regulating the supply of fuel and air to the furnace. Infiltration of air through the furnace system was reduced by the use of insulation and sealing cement on the roof and side walls of the checker chambers.

The weight of ingots averaged 64.3 tons to the heat and the average time of the heat from charge to tap was 7 hr. 25 min. The unit heat figures are set in the further tabulation.

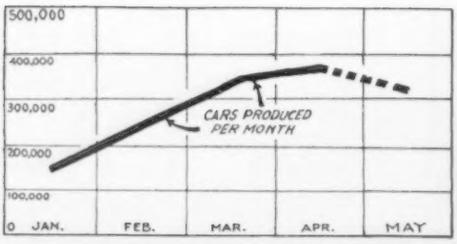
Fuel per gr. ton ingots, million B.t.u.	6.164
Fuel per hour, million B.t.u.	53.383
Heat radiated per hour, million B.t.u.	9.946
Waste gases entering checkers, deg. F.	2633
Waste gases leaving checkers, deg. F.	1649
Mean Temp. waste gases (2633 + 1649) ÷ 2	2141
Air to checkers, deg. F.	80
Air from checkers, deg. F.	2023
Mean Temp. of air (80 + 2023) ÷ 2	1052
Mean Temp. of brickwork (2141 + 1052) ÷ 2	1596
Mean Temp. diff. between air & brickwork (1596 — 1052)	544
B.t.u. absorbed by air from checkers per hr.	12,876,000
Heating surface in checker chamber, sq. ft.	12,672
Coefficient of heat transfer (B.t.u. per hr. per sq. ft. per deg. temp. difference)	1.868
Heat transfer in B.t.u./hr./sq. ft. checker heating surface B.t.u. per hr per sq. ft.	1,016

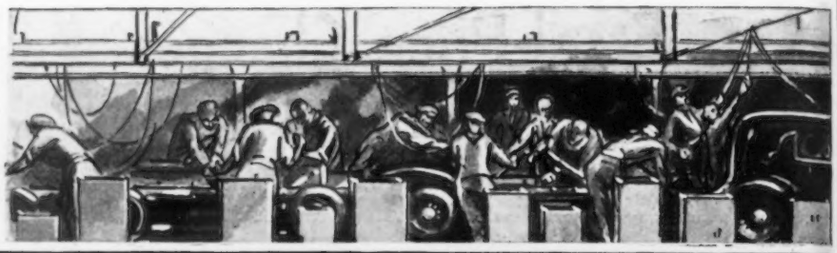
Steel Price Changes

NEW minimum prices filed with the American Iron and Steel Institute follow:

Product and Effective Date	Base Price, Lb.	Basing Point
Stainless Type No. 302, May 29.		Pittsburgh
Analysis: Carbon, over 0.08 to 0.20 Chrome, 17 to 19 Nickel, 7 to 9		
Hot-rolled strip	20¾c.	
Stainless Type No. 304, May 29.		Pittsburgh
Analysis: Carbon, 0.11 max. Chrome, 17 to 19 Nickel, 7 to 9		
Hot-rolled strip	22¾c.	
Cold-rolled strip	29c.	
Slabs	16c.	
Stainless Type No. 305, May 29.		Pittsburgh
Analysis: Carbon, over 0.08 to 0.20 Chrome, 19 to 20 Nickel, 8 to 10		
Hot-rolled strip	22¾c.	
Cold-rolled strip	29c.	
Slabs	16c.	
Stainless Type No. 306, May 29.		Pittsburgh
Analysis: Carbon, 0.11 max. Chrome, 18 to 20 Nickel, 8 to 10		
Hot-rolled strip	24¾c.	
Cold-rolled strip	31c.	
Slabs	17c.	
Stainless Type No. 307, May 29.		Pittsburgh
Analysis: Carbon, over 0.08 to 0.20 Chrome, 19 to 22 Nickel, 9 to 12		
Bars	25c.	
Hot-rolled strip	24¾c.	
Cold-rolled strip	31c.	
Slabs	17c.	
Stainless Type No. 308, May 29.		Pittsburgh
Analysis: Carbon, 0.11 max. Chrome, 19 to 22 Nickel, 9 to 12		
Hot-rolled strip	26¾c.	
Cold-rolled strip	33c.	
Slabs	18c.	
Stainless Type No. 416, May 29.		Pittsburgh
Analysis: Carbon, 0.12 max. Chrome, 12 to 15 Plus sulphur, silenium or molybdenum		
Hot-rolled strip	15¾c.	
Cold-rolled strip	20½c.	
Slabs	10¾c.	
Class 1 Tool Steel, June 1.		Bethlehem
Analysis: Tungsten and/or Molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1 max.		
Bars	55c.	
Class 2 Tool Steel, June 1		Bethlehem
Analysis: Tungsten and/or Molybdenum, 10 to 15 Chrome, 1.50 to 4 Vanadium, 0.20 to 0.80		
Bars	47c.	
Class 2A Tool Steel, June 1.		Bethlehem
Analysis: Tungsten and/or Molybdenum, 6.50 to 9.50 Chrome, 1.50 to 8.00 Vanadium, 0.20 to 0.80		
Bars	42c.	
Class 1 Tool Steel, June 1.		Syracuse, N. Y.
Analysis: Tungsten and/or Molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1 max.		
Bars	55c.	
Billets	49½c.	
Class 1A Tool Steel, June 1.		Pittsburgh and Syracuse
Analysis: Tungsten and/or Molybdenum, 19 approx. Chrome, 4 approx. Vanadium, 1.30 to 2.30		
Bars	65c.	
Billets	58½c.	
Class 1E Tool Steel, June 1.		Pittsburgh
Analysis: Tungsten and/or Molybdenum, 14 approx. Chrome, 4 approx. Vanadium, 1.50 or over		
Bars	55c.	
Billets	49½c.	
Class 2A Tool Steel, June 1.		Pittsburgh
Analysis: Tungsten and/or Molybdenum, 6.50 to 9.50 Chrome, 1.50 to 8.00 Vanadium, 0.20 to 0.80		
Bars	42c.	
Billets	37.8c.	
	100 Lb.	
Electrical sheets, May 29.		Gary, Ind.
Dynamo special (disposal grade)	$4.84	
Motor special (disposal grade)	4.34	
Class 1 Tool Steel, June 1.		Pittsburgh
Tungsten and/or molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1 max.		
Bars	55c.	
Billets	49½c.	
Class 2 Tool Steel, June 1.		Pittsburgh
Tungsten and/or molybdenum, 10 to 15 Chrome, 1.50 to 4 Vanadium, 0.20 to 0.80		
Bars	47c.	
Billets	42.3c.	
Class 1 Tool Steel, June 1.		Bethlehem
Tungsten and/or molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1 max.		
Billets	49½c.	
Class 1A Tool Steel, June 1.		Bethlehem
Tungsten and/or molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1.30 to 2.30		
Bars	65c.	
Billets	58½c.	
Class 1D Tool Steel, June 1.		Bethlehem
Tungsten and/or molybdenum, 18 approx. Chrome, 4 approx. Vanadium, 1 approx. Cobalt, 9.50 to 14.00		
Bars	$2.00	
Billets	1.80	
Class 1E Tool Steel, June 1.		Bethlehem or Syracuse
Tungsten and/or molybdenum, 14 approx. Chrome, 4 approx. Vanadium, 1.50 or over		
Bars	55c.	
Billets	49½c.	
Class 2 Tool Steel, June 1.		
Tungsten and/or molybdenum, 10 to 15 Chrome, 1.50 to 4.00 Vanadium, 0.20 to 0.80		
Bars	47c.	Syracuse, N. Y.
Billets	42.3c.	Bethlehem, Pa., or Syracuse, N.Y.
Class 2A Tool Steel, June 1.		
Tungsten and/or molybdenum, 6.50 to 9.50 Chrome, 1.50 to 8.00 Vanadium, 0.20 to 0.80		
Bars	42c.	Syracuse, N. Y.
Billets	37.8c.	Bethlehem, Pa., or Syracuse, N.Y.
Electric furnace plain-carbon steel, hot rolled, general requirement grade, but not including tool steel grade, May 31.		Chicago
	100 Lb.	
Carbon up to 0.50, inc. Alloy quality bar	$3.05	
	Gross Ton	
Alloy quality billet	$61	
	100 Lb.	
Carbon 0.51 to 0.80, inc. Alloy quality bar	$3.30	
	Gross Ton	
Alloy quality billet	$66	
	100 Lb.	
Carbon 0.81 to 1.05, inc. Alloy quality bar	$3.55	
	Gross Ton	
Alloy quality billet	$71	
Electric furnace S.A.E. 1095 spring steel rounds.		
	100 Lb.	
Alloy quality bar	$3.05	
Hot-rolled sheets coiled for rerolling—24 in. to 48 in. wide, May 28.		
No. 10 ga	2.00	Pittsburgh
No. 10 ga	2.10	Gary, Ind.
Breakdowns for conversion into sheets, May 28.		
No. 10 ga	2.00	Pittsburgh
No. 10 ga	2.10	Gary, Ind.
	Per Lb.	
Hollow drill steel, June 1.		Syracuse or Bethlehem
Carbon, 0.80 approx. Manganese, 0.30 approx. Phosphorus, 0.02 max. Sulphur, 0.02 max. Silicon, 0.15 approx.		
Bars	10c.	
	Per Cent	
Standard pipe (steel), ¾ to 1½ in. buttweld double extra strong plain end, May 25.		Pittsburgh
Black	49 & 5	
Galvanized	41 & 5	
Line pipe (steel), 1 in. to 3 in. buttweld T&C, May 29.		Pittsburgh
Black	63 & 5	
4½ in. O. D. to 6⅝ in. O.D. lapweld plain end standard weight, May 14.		Pittsburgh
Black	68 & 5	
Water well casing (steel) (S & S random lengths), 7¼ in. to 8¼ in., May 14.		Pittsburgh
Black	54 & 5	
Large O. D. pipe (steel) (random lengths plain end), 14 in. O. D. x 5/16 in. and heavier, May 14.		Pittsburgh
Black	64 & 5	

NOTE: Basing discount lists have been filed showing substantially proportionate changes in basing discounts applicable to other sizes of the above mentioned products.





THIS WEEK ON THE

Automobile Makers in Spirited Retail Sales Drive

DETROIT, MAY 22.

REALIZING that it made a major error when it raised prices about April 1, thereby checking the upward surge of retail sales, the automobile industry now is bending every effort to correct the damage which has been done without officially acknowledging its blunder.

Resorting to the methods used successfully during the depression to stimulate sales, General Motors is making elaborate preparations for exhibits of its products in 60 cities during the week of June 2. There is no reason to doubt that this sales push will accomplish its objective of increasing retail demand for a temporary period.

Different means of reversing the present downward sales trend are being employed by other manufacturers. Dodge Brothers are introducing a line of cars to supplement their 1934 series, featuring a low base price. This line is essentially the same as the cars announced last January, except that a few gadgets have been omitted. Hudson has done practically the same thing as Dodge, having announced the past week a new Terraplane six to be known as the Challenger series. It is featured as "the biggest car in the lowest price zone" and carries a base price at the factory of $565. The conventional front axle is used.

Price Advances Criticized

Some observers are of the opinion that retail demand would not have been so retarded if manufacturers had chosen other means than they did to boost prices. Instead of bluntly announcing an increase of $25 to $200, they might have quietly readjusted upward the prices of one model and a few weeks later of another model, without any fanfare of publicity. Thus the increases could have been administered in comparatively palatable doses.

As against this suggested method, certain critics advocated dropping several of the gadgets which scarcely could be classified as essential. In this way the added labor and materials costs would be partially offset by elimination of expensive "extras."

The retail sales experience of a leading motor car company in the first 10 days of May perhaps was typical of the entire industry's performance, with the possible exception of the Ford Motor Co. Its volume of deliveries to customers declined about 20 per cent compared with the same period in April, whereas normally May should be better than April.

There is a bright side to the situation. Latest sales figures show that business is improving slightly, although it usually gets better as the month progresses. That is, the first week of any month is normally the poorest week because of the sales drive in the closing days of the previous month to get as many sales as possible crowded into that month.

Retail Sales Improve Slightly

For the week ended May 12, Plymouth delivered to users 7675 cars, a gain of 8 per cent over the previous week. Dodge likewise improved its sales during the same week, with 5589 units delivered, compared with 5122 the preceding week.

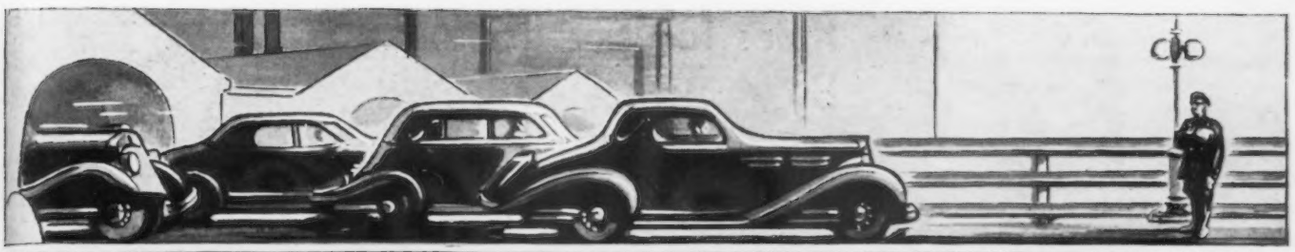
It should be remembered that expectations are much higher today than they were a year ago. Sales may be disappointing at the moment, yet they are consistently running far in advance of May, 1933. In the case of Chevrolet, the increase amounts to more than 30 per cent, of Plymouth 38 per cent, of Dodge 119 per cent.

Another factor to be considered is the experience subsequent to price advances in the past. The initial effect is to cut down substantially the volume of business, but after the shock of the announcement has worn off, business swings back into a normal gait. Now that six weeks have passed since the new prices were put into effect, manufacturers are hoping that history will repeat itself and sales will recover some of the ground lost in recent weeks.

May Output to Be 300,000 Cars

Even when the most optimistic light is thrown on the present automotive picture, the effect is hardly pleasing to either the automobile industry or the steel trade. Motor car output this month will not exceed 325,000 units and may not be much above 300,000 units. It is impossible to forecast June production at this time, except to state that it will be lower than May.

In July, August and September of last year, assemblies totaled 684,084 units, an average of 228,028 units a month. Unless the unexpected happens, it is believed that third quarter production this year will not equal that in 1933. On the other hand, earlier introduction of new models for 1935 is likely to give an impetus to manufacture in the fourth quarter which it did not possess in the corre-



ASSEMBLY LINE

sponding period of last year because of the tool and die strike.

It is no secret that automobile companies have been planning on moving forward a few months the announcement of new models, partially in an effort to help stabilize employment. Certain makers had scheduled new cars for introduction in September or October. In fact, it is understood that most companies have been considering the public debut of new lines before the first of the year. Part of the line would be held back for the January shows, so that something new could be revealed at that time.

It is impossible to tell how much this plan has been upset by the hesitant attitude of both General Motors and Chrysler in making capital expenditures for new equipment in face of labor difficulties and of the uncertainty regarding the future program of the Roosevelt administration. It is not too late, however, for the plan to be carried through by at least some companies, and signs are multiplying to indicate that machinery buying on a considerable scale may materialize shortly. The situation has changed for the better in the machine tool trade in the past week.

Pontiac and Buick to Buy Equipment

Pontiac Motor Co., with a large program ahead for its six-cylinder car, is the most immedaite prospective purchaser of equipment. It is not yet definitely known how extensive its expenditures will be. Buick is preparing a tooling program for its 1935 cars which calls for a large amount of new equipment. While this program will not be anywhere near so great as originally contemplated, it should be comparable at least with that for the 40 series.

Packard has an enlarged force of designers working on its proposed $1200 car. The engine now being considered for this job is understood to resemble the present Pontiac straight-eight motor. Packard is said to have several ex-General Motors men, formerly associated with Pontiac, working on this car. The tooling up is likely to be on a basis of 25

By **BURNHAM FINNEY**
Detroit Editor, THE IRON AGE

units an hour. No information is available as to what equipment will be bought by the Packard company.

The AC Spark Plug Co., which is reported to be planning a reorganization of its production facilities, is said to be figuring on the purchase of a considerable number of new machine tools. The Chevrolet Motor Co. is in the initial stages of planning its equipment buying requirements for the 1935 line at its local gear and axle plant.

Ford Reported to Have Made Alliance with Mathis

The Ford Motor Co. is understood to have concluded a working agreement with Mathis, the French car manufacturer, whereby the two companies will cooperate in production of two new passenger cars and a line of commercial cars and trucks in France. The story is that one of the passenger car jobs will be powered by the Ford 44 motor, a V-eight engine designed for the proposed small Ford car which thus far has been held back from production in this country.

The other passenger car will have what might be termed a "22" motor. That is, it will be a four-cylinder car, with one bank of cylinders of the Ford V-eight motor straightened up. The commercial and truck job may have the model B four-cylinder motor.

Whether the motor or other parts for this French line of cars, which may be called the "Maford," will be built at the Rouge plant is not known. It is fairly well determined that whatever equipment is necessary will be purchased by the Ford Motor Co. in this country. One of the key engineering officials of the Ford company now is in France surveying the plant facilities of the Mathis organization and deciding what new machinery must be bought. It is not probable that any equipment will be bought for the proposed cars until his return to Dearborn.

If Ford precedent should be followed, it is possible that some of the equipment now installed at the Rouge plant may be sent to the Mathis plant in France and new machine tools bought for Rouge. The new French jobs will not be manufactured in large volume, as American makers think of volume. This reported alliance between Mathis and Ford is particularly interesting because it will pit Henry Ford against Andre Citroen, who often is referred to as the "Ford of France."

Present Springing Probably to Be Retained

It is not believed that either General Motors or Chrysler will go over in 1935 to the new type of independent springing developed by the Leaf Spring Institute and described in this column last week. Both corporations have invested so much money in machinery to produce the type of knee-action units with coil springs now used as standard equipment that they will not wish to make a change for at least another year in order to realize an adequate return on their investment. Then the present knee-action design has been so widely advertised and merchandised that it could scarcely be abandoned overnight without embarrassing repercussions.

What seems probable is that some manufacturers who have not gone in for independent springing may take up with the new design of the leaf spring manufacturers, using the new units on next year's models. Independent springing in one form or another is apparently here to stay. It is reported that the Airflow Chryslers and De Sotos may have knee-action equipment in 1935.

Chevrolet turned out 27,627 units in the first 10 days of May, compared with 22,622 in the same period a year ago. Up to May 10 this year, it had assembled 360,343 units, as against 230,911 units in the corresponding period of 1933. Sales in the first 10 days of this month totaled 24,226 units, raising the amount for the year

to date to 305,259 units, compared with 202,738 in the same period of last year. Chevrolet should turn out about 85,000 to 90,000 cars this month.

Buick Back in Production

Pontiac is reported suffering from its dual dealership with Buick, which is being unscrambled as rapidly as possible. Dealers have been pushing the new Buick 40 series at the expense of the Pontiac eight. Buick is back in production, now that the strike has been settled at Fisher plant No. 1 in Flint. However, its assemblies this month will be far below expectations. The Buick 40 has been unusually well received throughout the country. Oldsmobile is proceeding at a good pace, and La Salle is taking with the public, output being sustained near 100 units a day.

Chrysler probably will make about 70,000 units in May, as against 82,000 in April. It is expected that much of the loss will be in the Dodge division. Plymouth is continuing with little indication of a slackening in its rate. Factory shipments the week ended May 12 were 10,469 cars.

The Ford program is unchanged, with production well above 100,000 units a month. Briggs and Murray are particularly busy on Ford work.

The slackening pace of the automobile industry generally is being felt by parts suppliers who have been asked to hold up shipments and in some cases to cancel orders. Steel releases have been far below expectations. Increased specifications are anticipated in the next 10 days, as users finally cover at old prices, but it is apparent that speculative buying will be almost entirely absent.

Factory Shipments Lower

Factory shipments of automobiles this week are considerably lower than last week and in some cases are 25 to 30 per cent below those in the same week of April. On account of the unfavorable outlook, it is known that some manufacturers are planning on closing their plants for several weeks this summer, whereas in 1933 they operated without interruption through July, August and September. However indications are that the Ford Motor Co. will continue to run its Rouge plant without a production break during the summer. It is understood that Packard in tooling up for its light car will mostly resort to the rebuilding of present equipment rather than to the purchase of new machine tools, although some new machinery probably will be on its list. It is reported that Packard will set up a separate manufacturing organization to build the new car. Machine tool purchases of A. C. Spark Plug Co. which recently decided to go into the production of automotive bearings may amount to half a million dollars.

Rules for Layoffs Made By Auto Labor Board

IN view of substantial layoffs in various automobile plants the past few weeks and of other layoffs to occur shortly the Automobile Labor Board has formulated rules which shall be followed by motor car companies in decreasing their forces. The most important rule is that "employees whose work in the judgment of the management is essential to the operation of the plant and production or who have received special training or have exceptional ability may be hired, retained or returned to work," notwithstanding the provisions of other rules and regulations.

Aside from this major provision employees hired after Sept. 1, 1933, shall be the first to be laid off regardless of marriage or dependency. Employees next to be laid off shall be those hired before Sept. 1, 1933, who are unmarried and without dependents except in the cases of employees of long service. In the next class are those employees hired before last Sept. 1, who are married or who have dependents, the employees of less service being laid off before employees of longer service.

When a company is to increase its force, employees hired before Sept. 1, 1933, who are married or have dependents shall be the first to be returned to work except for employees of long service who are unmarried and without dependents. Those employees hired before last Sept. 1, who are unmarried and without dependents shall be returned to work before new people are hired. Length of service in all cases shall be determined as from the date of employment in the plant or similar plants of the same employer rather than by length of employment in the group department or on any job. Where the qualifications set forth are equal, the skill and efficiency of the individual employees as judged by the management shall determine preference in being returned to work.

The Automobile Labor Board last week brought to an end the strike of employees of Fisher body plant No. 1 in Flint, through agreement on the part of the management and the workers to settle differences in joint conference.

N.A.P.A. Convention Program Arranged

PURCHASING under NRA codes will be the keynote of the nineteenth annual international convention of the National Association of Purchasing Agents, to he held June 18 to 21 at the Hotel Cleveland, Cleveland. A feature of the program is a series of plant visitations to characteristic industrial enterprises in the Cleveland district. Among speakers scheduled are Walter S. Tower, executive secretary, American Iron and Steel Institute; W. E. Ellis and H. O. King, coal and copper code administrators respectively, and various prominent purchasing agents.

Patina Produced Now By Spraying

AN account was printed in these columns some months ago regarding the perfection of a process for artificially imitating the beautiful green color which forms on copper roofs after weathering. This patina ordinarily requires some 12 to 14 years to form. It is chemically a basic carbonate or sulphate of copper. The new process referred to consisted in forming this color on copper sheets by chemical reactions before they are installed. A special solution of ammonium sulphate was used.

Now comes the interesting announcement that this accelerated patina can be formed on copper roofs in place by spraying a similar solution on the metal. When weather conditions are favorable, as for instance not too much rain or dampness in the atmosphere, the green coating is formed in not more than 24 to 48 hr. —a marked contrast to the natural formation period of 12 to 14 years. A steeple in a Brooklyn church was recently treated to a patina coating by this method. An extended description of the process and its application appears in the April issue of *Metals and Alloys*.

Navy Department to Buy Forging Steel

WASHINGTON, May 22. — Bids will be opened June 8 by the Bureau of Supplies and Accounts, Navy Department, for 425 tons of forging steel for shafting for 10 destroyers, two each to be built at the Boston, Philadelphia, Norfolk, Mare Island and Puget Sound navy yards. The bureau reserves the option to purchase the forgings for two extra destroyers at the prices submitted.

On June 5 the bureau will open bids for approximately 100 tons of rotor forgings for two cruisers, one each to be built at the Philadelphia and Brooklyn yards. Option is reserved to purchase steel for an additional cruiser at the prices quoted.

Steel Rate Drops Three Points in First Real Setback of the Year

Production Adversely Affected by Steel Strike Threat and Other Negative Influences—Few Changes in Steel Code Looked For

THE negative influences that made their appearance in the iron and steel industry a fortnight ago are multiplying, and ingot output has suffered its first important setback of the year, falling three points to 58 per cent of capacity.

Formal submission of demands on the mills by the Amalgamated Association of Iron, Steel and Tin Workers, further recession in motor car production, continuance of drought in the Central West, accumulating uncertainty as to Administration policies, and growing concern over the strike fever pervading labor in all branches of industry are among the formidable array of factors that have undermined business confidence.

SCRAP, the most sensitive barometer of the steel trade, has undergone further price declines in virtually all centers. THE IRON AGE scrap composite, which has receded from $11.67 to $11.17 a gross ton, now stands at the lowest level of the year to date.

Scrap first began to weaken in the middle of March, when the iron and steel trade made its initial moves to advance prices. The assumption then was that buyers would accumulate so much steel and pig iron during the second quarter at pre-advance prices that production would suffer a severe reduction in the third quarter. While there has been some stocking of pig iron and staple forms of finished steel, speculative accumulations have fallen below expectations. Except for certain producers of sheets and strips, no mills are apprehensive of experiencing difficulty in filling their commitments for the current quarter unless the strike threat of the Amalgamated association provides a new stimulus to specifications.

While tin plate releases seem to have been given a fresh impetus because of the danger of labor disturbances at the mills, shipping orders in general are showing less and less response to any considerations outside of actual current requirements. Much of the steel contracted for by the automobile industry for this quarter is expected to be canceled. Some motor car companies will accept only enough steel to cover their July requirements. One reason for their increasing conservatism is the growing likelihood of a summer shutdown of several weeks' duration. Part of the recession in car sales is ascribed to the unwillingness of labor to risk purchases in the face of enforced unemployment during existing or expected strikes.

Steel releases from the farm equipment industry are declining as seasonal influences and drought conditions force retrenchment in manufacturing operations.

PRODUCERS of iron and steel will open books for the third quarter June 1, but little contracting is looked for since few price changes are likely. Among the probable exceptions are cold-finished steel bars which are slated for a $3 a ton advance and sheet steel piling which will be restored to the prices that recently failed to hold. A general revision of steel boiler tube discounts, probably averaging two and one-half points lower than those on the present cards, is also expected.

Iron ore prices have been established for the season at unchanged prices by four open market sales involving several thousand tons.

Standardization of various tool steels according to chemical analysis is one of the latest accomplishments under the steel code. Heretofore tool steel has been sold solely on a brand basis and it had long been held that standardization was impossible because methods of manufacture count for so much more than chemical content.

CONTINUATION of the steel code is now regarded as a certainty. While the changes that will be made as a result of conferences with NRA officials have not been announced, it is believed that they will be of a minor character. Several new basing points and arbitrary allowances on water deliveries of steel are regarded as reasonably sure. Latest reports, however, indicate that the 10-day waiting period after the filing of prices may be retained.

Steel output is off one point to 49 per cent at Pittsburgh, one and one-half points to 62½ per cent at Chicago, one point to 45 per cent in the Philadelphia district, five points to 60 per cent in the Valleys, two points to 65 per cent at Cleveland, five points to 57 per cent at Buffalo, and five points to 74 per cent in the Wheeling district. The Detroit rate is unchanged at 100 per cent.

THE IRON AGE composites for pig iron and finished steel remain at $17.90 a ton and 2.222c. a lb. respectively.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	May 22, 1934	May 15, 1934	Apr. 24, 1934	May 23, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$16.34
No. 2, Valley furnace	18.50	18.50	18.50	14.50
No. 2 Southern, Cin'ti	19.13	19.13	18.13	15.82
No. 2, Birmingham†	14.50	14.50	13.50	12.00
No. 2 foundry, Chicago*	18.50	18.50	18.50	16.00
Basic, del'd eastern Pa.	19.76	19.76	19.76	16.09
Basic, Valley furnace	18.00	18.00	18.00	14.00
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	16.89
Malleable, Chicago*	18.50	18.50	18.50	16.00
Malleable, Valley	18.50	18.50	18.50	14.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.17
Ferromanganese, seab'd carlots	85.00	85.00	85.00	68.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	30.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	26.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	26.00
Slabs, Pittsburgh	29.00	29.00	29.00	26.00
Forging billets, Pittsburgh	34.00	34.00	34.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.60
Bars, Chicago	1.95	1.95	1.95	1.70
Bars, Cleveland	1.95	1.95	1.95	1.65
Bars, New York	2.23	2.23	2.23	1.95
Plates, Pittsburgh	1.85	1.85	1.85	1.50
Plates, Chicago	1.90	1.90	1.90	1.70
Plates, New York	2.13	2.13	2.13	1.598
Structural shapes, Pittsburgh	1.85	1.85	1.85	1.60
Structural shapes, Chicago	1.90	1.90	1.90	1.70
Structural shapes, New York	2.10¼	2.10¼	2.10¼	1.8677b
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	1.70
Hot-rolled strips, Pittsburgh	2.00	2.00	2.00	1.55
Cold-rolled strips, Pittsburgh	2.80	2.80	2.80	2.00

Finished Steel

Per Lb.:	May 22, 1934 Cents	May 15, 1934 Cents	Apr. 24, 1934 Cents	May 23, 1933 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.65	2.65	2.65	2.10
Hot-rolled annealed sheets, No. 24, Gary	2.75	2.75	2.75	2.20
Sheets, galv., No. 24, P'gh	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, Gary	3.35	3.35	3.35	2.80
Hot-rolled sheets, No. 10, P'gh	2.00	2.00	2.00	1.50
Hot-rolled sheets, No. 10, Gary	2.10	2.10	2.10	1.60
Wire nails, Pittsburgh	2.60	2.60	2.60	1.85
Wire nails, Chicago dist. mill	2.65	2.65	2.65	1.90
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., P'gh	3.00	3.00	3.00	2.35
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.40
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	*$12.25*	$12.75	$14.00	$11.50
Heavy melting steel, Phila.	*10.50*	11.25	11.50	9.00
Heavy melting steel, Ch'go	*10.75*	11.00	11.75	8.50
Carwheels, Chicago	*10.75*	11.25	11.75	9.50
Carwheels, Philadelphia	*12.50*	12.75	13.00	9.75
No. 1 cast, Pittsburgh	*12.75*	13.25	13.75	10.50
No. 1 cast, Philadelphia	*12.25*	12.50	13.00	10.25
No. 1 cast, Ch'go (net ton)	*8.50*	9.00	9.50	8.75
No. 1 RR. wrot., Phila.	*12.25*	12.50	12.50	10.75
No. 1 RR. wrot., Ch'go (net)	*8.50*	8.75	9.50	6.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$1.75
Foundry coke, prompt	4.60	4.60	4.60	2.50

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.25	8.25	8.25	6.75
Lake copper, New York‡	8.62½	8.62½	8.50	7.00
Tin (Straits), New York	*53.40*	53.12½	55.90	36.00
Zinc, East St. Louis	4.35	4.35	4.37½	3.77½
Zinc, New York	4.70	4.70	4.72½	4.14½
Lead, St. Louis	*3.85*	4.10	4.10	3.52½
Lead, New York	*4.00*	4.25	4.25	3.65
Antimony (Asiatic), N. Y.	*8.37½*	8.60	7.95	6.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
May 22, 1934	2.222c. a Lb.	$17.90 a Gross Ton	$11.17 a Gross Ton
One week ago	2.222c.	17.90	11.67
One month ago	2.222c.	17.57	12.42
One year ago	1.892c.	14.56	9.67
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1934	2.222c., April 24;	2.028c., Jan. 2	$17.90, May 1;	$16.90, Jan. 27	$13.00, Mar. 13;	$11.25, May 22
1933	2.036c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Steel Strike Threat Beclouds Outlook at Pittsburgh

Unpredictable Course of Administration's Policies and Automotive Slump Add to Uncertainty — Ingot Output Off—Scrap Still Declining

PITTSBURGH, May 22.—Threats of a widespread steel strike, the uncertain course of the Administration's policies and the rather sharply curtailed activity in the motor car industry have combined to make the forward outlook in the steel industry decidedly unimpressive.

At the moment, however, most steel producers here are inclined to cross bridges when they come to them. Immediate attention is being concentrated on fulfillment of fairly well sustained specifications against second quarter contracts. Although not all producers can boast of abnormally heavy order books, at least one or two steel makers will have their hands full to meet the shipping deadline on June 30. Although an expected drought of orders will probably usher in the third quarter, steel producers, whose second quarter backlogs already are so heavy that some tonnage will have to be canceled at the close of the quarter because of inability to meet the code shipping provision, are offered little hope of concessions that might enable them to carry over much needed tonnage at the outset of the coming quarter.

The severest tax next month will be on sheet mills, which have received further impetus from a fairly heavy rush of specifications in the past week. The sheet mill group has consequently boosted its average operations to 65 per cent. Strip mills are faring equally as well with the same rate of operation. Tin plate mills are likewise enjoying a spurt in specifications, and are holding operations at a strong 75 per cent of capacity.

Although the recent flow of business from miscellaneous sources has been surprisingly heavy, the decline in specifications from the automotive industry is being felt in some steel departments. New railroad buying has dwindled, and rail makers and producers of track accessories find themselves with very thin backlogs after the much advertised Federal program for carrier purchases.

Ingot output in the Pittsburgh district has receded only one point to 49 per cent. In the Valleys and nearby northern Ohio mills operations are off 5 points to 60 per cent. Open-hearth activity in the Wheeling district is also down five points to 74 per cent.

Barometric of steel business for the early future is the general drift of scrap prices to lower levels. No. 1 heavy melting steel at Pittsburgh has dropped 50c to $12 to $12.50, delivered.

Pig Iron

Shipments are being ordered out generally at contract rates. The movement of Bessemer and basic pig iron is far in excess of aggregate volume of foundry iron. The latter grade is extremely quiet. May shipments will probably exceed slightly those in April. Buying at the new prices has been restricted to spot minimum carloads.

Semi-Finished Steel

The movement of semi-finished steel to non-integrated mills is fairly well sustained. A pick-up in tin mill activity has renewed demand for sheet bars. Pressure from sheet mills for deliveries of sheet bars still is rather severe. Fairly heavy schedules at some pipe mills provide a good outlet for skelp. Forging billets have recently been in good demand.

Bolts, Nuts and Rivets

Activity in this market continues to be restricted largely to railroad specifications, which are holding fairly well for car construction and general repairs. Purchases against the Navy construction program have not entirely covered the potential requirements, and a fair tonnage for this work still is in the offing.

Warehouse Business

With most warehousemen adhering to the recently advanced quotations, demand is barely holding its own. Hot-rolled items are moving fairly steadily, and galvanized sheets are the most active grade on warehouse lists.

Rails and Track Accessories

The local rail mill is continuing its schedule of production on the basis of 4000 to 5000 tons of rails a week. Only a small tonnage of track accessories is reported to be in prospect in connection with the 10,000-ton order for rails placed by the Reading Co. Miscellaneous requirements of the carriers are not so well sustained as in recent weeks. Prospects for new rail and companion fastening business are very obscure.

Bars

General specifications have decreased. Reduced takings by motor car manufacturers have made the largest dent in mill order books. The present movement is largely sustained by demand from jobbers and the bolt and nut trade. The mood of buyers, which earlier in the quarter indicated a disposition to cover against the $3 a ton price rise, has apparently given way to a cautious policy. The expected heavy pressure on bar mills next month will likely not be so severe as anticipated.

Specifications for public works projects and road construction have quickened activity in the reinforcing bar market.

Cold-Finished Steel Bars

Specifications in the past week were considered satisfactory. Automotive tonnage continues to dwindle, but acceptances by jobbers and other manufacturing lines are well maintained. Although no price advances have been filed, it is reported that cold finishers will mark up prices $3 a ton some time next month.

Plates and Shapes

Railroad car construction and repair work provide the only definite impetus to activity in the plate market. Tank construction is at a low ebb, and barge work is similarly depressed. Prospective work in all lines requiring plates is very indefinite and not particularly encouraging.

Fresh structural steel inquiries in the past week were small. Awards, though well spread, were likewise of a minor character with respect to individual tonnages. Releases of additional PWA funds are very slow, and the effect on structural steel demand is obvious.

Sheet Piling

Effective June 25 prices will be advanced $3 a ton at all basing points. The new bases will be 2.15c. a lb., Pittsburgh; 2.25c. Chicago and Buffalo, and 2.60c. on cars at Gulf port and Pacific port docks. Bids are being taken until May 28 by the United States Engineer office at Jacksonville, Fla., for construction of the Matanzas Inlet dike for the Intercoastal waterway from Jacksonville to Miami, which will require about 1000 tons of sheet piling.

Tubular Products

General revisions in the discount cards covering steel boiler tubes are

expected to be effected on June 1. Some sizes will be advanced, with discounts probably averaging 2½ points lower than those on present cards. Possibly in anticipation of the advance, consumers are specifying more freely. Demand from the railroads, though not notably heavier, is definitely improved. Releases on contracts covering oil country goods are exceptionally brisk, and producers expect all tonnage against pre-advance contracts to be specified liberally before the close of the quarter. Mechanical tubing shows the effects of reduced schedules in the automotive industry.

Wire Products

Production at some mills may be said to be in anticipation of heavy demand against low-priced contracts next month. At the moment, however, releases are somewhat irregular. Aggregate movement of manufacturers' wire has slumped noticeably as a result of reduced takings by the motor car industry. Deliveries to the jobbing trade are fairly well maintained.

Sheets

A heavy influx of miscellaneous specifications in the past week has forced some mills to increase rolling schedules. Average operations for the sheet mill group are consequently five points higher this week at 65 per cent of capacity. This increase was accomplished despite a further conspicuous decrease in automobile tonnage, which clearly reflects further reduction in output of motor cars. Releases against second quarter contracts have been particularly heavy from stove, agricultural implement, refrigerator and electrical equipment manufacturers.

Tin Plate

Specifications spurted in the past week, and operations are holding strongly at 75 per cent of capacity. In at least one case, schedules have been stepped up slightly to meet the heavier demand. At some mills, production of stocks in anticipation of specifications from large consumers is the sustaining factor in present schedules.

Strip Steel

With mill backlogs gradually shrinking, the average production for strip mills is lower this week at around 65 per cent of capacity. Although miscellaneous releases on second quarter contracts have not abated noticeably, mill order books are suffering from a lack of automotive tonnage. Some producers, however, are sanguine of a renewed demand within a week or ten days from automobile producing centers.

Coal and Coke

Although consumption of fuel still is at a high rate, new buying is practically at a standstill. Current industrial activity, particularly in the local steel industry, is sufficiently brisk to cause measurable inroads in fuel stocks. Hence, if any semblance of activity may be expected in third quarter, producers of bituminous coal and coke believe that some imperative buying for that period is almost due. Depressed activity among local gray iron foundries has naturally taken its toll on demand for foundry grades of coke.

Scrap

The more pronounced uncertainty of forward business has depressed scrap prices to further low levels. Revisions in most cases average 50c a ton and represent largely nominal adjustments in the absence of significant trading. A few sales of distress scrap are reported at prices even below the new quoted levels. Practically all brokers openly admit a willingness to sell any quantity of No. 1 heavy melting steel at $12 to $12.50, but buyers have not shown the slightest inclination to nibble at these offerings. Dealers are offering only $10 for heavy breakable cast to cover old orders, and this grade is consequently marked down to $10 to $10.50. Railroad specialties, which are not so plentiful as most other grades, are down only 25c. No. 1 cast, which has resisted the downtrend in other grades for the past several weeks, has finally yielded to the general tendency and is quotably lower at $12.50 to $13. Despite the drift of prices to new low ground, it is questionable whether any important buying may be expected during the remainder of second quarter. Consumption of scrap in this period apparently reached its peak last week, and an expected decline in open-hearth activity for the rest of the quarter will enable consumers with low inventories to defer purchases probably until third quarter.

Steel Companies Receive Demands for Recognition from Amalgamated Group

PITTSBURGH, May 22.—The principal steel companies in this and nearby districts received demands by registered mail this morning from various lodges of the Amalgamated Association of Iron, Steel & Tin Workers. Although details of the demands were not made public, they are believed to have called for recognition of 253 lodges of the association widely distributed throughout the industry.

The aura of mystery surrounding the entire proceedings, which is apparently fostered by steel company executives as well as union officials, has led to many false reports concerning the situation. However, it is reliably reported that the lodges have requested replies to their communication by June 10. Whether or not refusal of recognition will result in a strike soon after that date has not been revealed. It is indicated, however, that steel producers will refuse and possibly ignore entirely the demands of the Amalgamated. In the meantime, the American Iron and Steel Institute is expected to issue a statement reflecting the attitude of the industry as a whole on the subject.

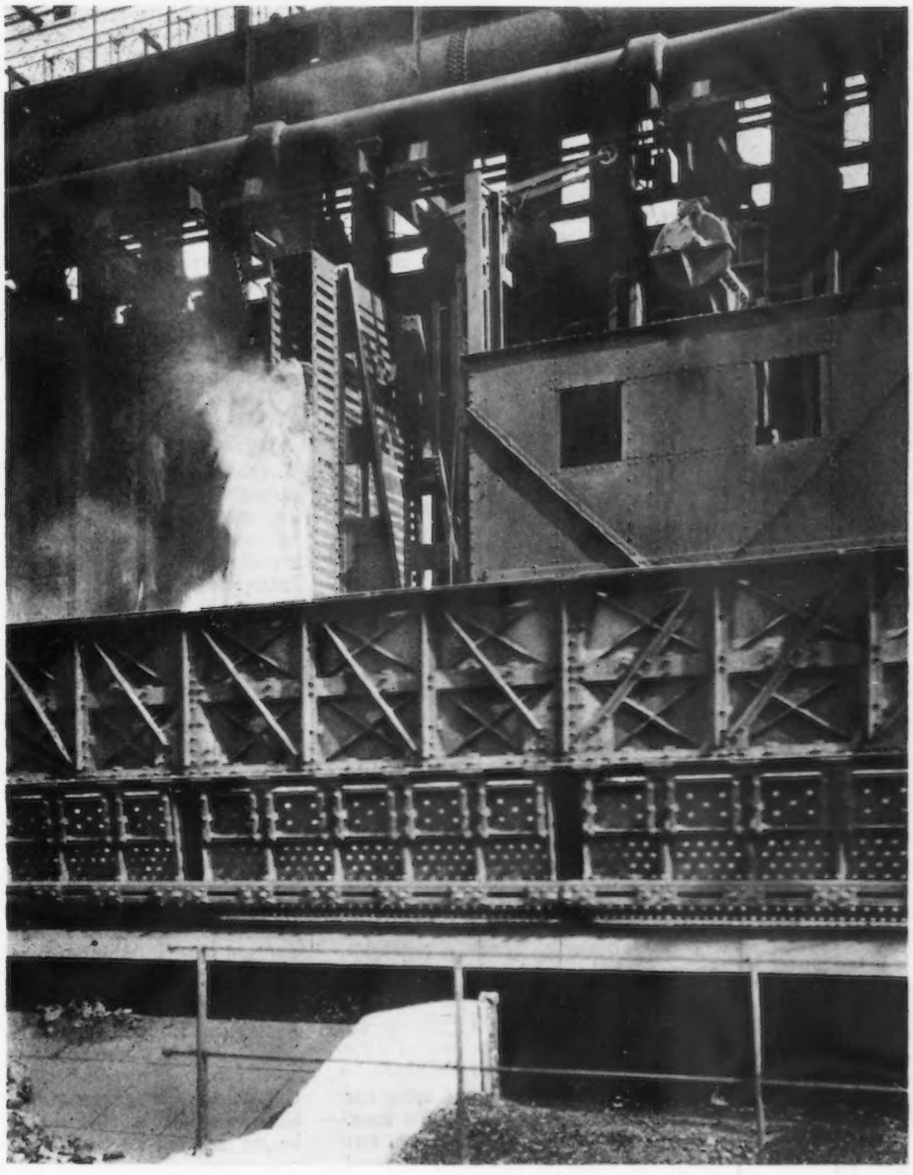
In the association's official demand for recognition, which according to M. F. Tighe, president of the union, has been sent to all lodges, the Amalgamated states that its lodges have been formed for the express purpose of bargaining collectively on all matters pertaining to wages, working conditions and such matters that come under the laws, rules and regulations of the union. President Tighe stated further that the lodges have been instructed to present the demand through lodge representatives or by registered mail. In accordance with a six-point program of action, drawn up at the association's recent conference at Pittsburgh, the union will take concerted action to declare a "holiday" by the middle of June if the demands are not met "in accordance with Section 7a of the National Industrial Recovery Act." Premature "holidays" or other interruption of work, according to reports, have been banned by Amalgamated officials. Under the union's program of action no lodge will be permitted to sign an agreement for recognition until all lodges have assurance of recognition.

The union makes no specific demands on the mills outside of the closed shop. However, it is considering filing a brief with the National Recovery Administration requesting a 6-hr. day, 30-hr. week, with $30 minimum weekly wages for unskilled labor.

The first new blast furnace at the new Corby Works, near Kettering, England, of Stewarts & Lloyds, Ltd., was lighted recently. This stack is the first unit to be started in connection with this enterprise, and is the first one in the United Kingdom of its kind, embodying all the latest improvements. The somewhat larger No. 2 blast furnace will be started in the fall, and these two units will furnish the iron for the new Corby Steel Works. This will be the first steel plant to be established on the Northamptonshire orefield and will manufacture steel by the basic Bessemer process.

PLANTS AND APPARATUS

for PREPARING, TREATING and HANDLING GAS AND COKE and BY-PRODUCTS



BY-PRODUCT • COKE • PLANTS •

KOPPERS CONSTRUCTION CO.

KOPPERS BUILDING PITTSBURGH, PA.

Chicago Ingot Rate Off 1½ Points to 62½ Per Cent

Reduced Specifying by Automobile and Farm Implement Plants and Waning Confidence Are Factors—Scrap Recedes

CHICAGO, May 22.—Ingot output is off 1½ points to 62½ per cent of capacity. Increased releases of car materials and a moderate upturn in specifications for structural materials, principally for highway bridge construction, prove insufficient to offset the reduced consumption of steel by automobile plants and the farm implement group. Although fewer sheets and cold-drilled strips are moving from this area to Detroit, the principal drop is being felt by forgers and consequently by the bar units at local mills. The demand for reinforcing bars for highway work had previously reached a high point and it seems improbable that this commodity can step into the breech and make up the loss in use of industrial bars.

Farm implement manufacturers, faced with the usual seasonal decline in their business, are also confronted by the drought conditions, which are still serious notwithstanding that some sections of the country have been visited by local rains.

In some grades of sheets demand is running full and releases that cannot be filled by the end of the quarter are being turned back.

The whole situation is tied in closely with a group of fears, among them labor trouble, the expected summer lull, the extent to which consumers have stocked ahead and the effect that the drought will have on business.

Pig Iron

The rate of shipments of Northern foundry iron is lower, now being about 18 per cent above April, whereas a week ago it was running 20 per cent ahead. Many users are stocking pig iron to gain the price advantage. However, automotive units and farm implement manufacturers have curtailed acceptances in line with actual needs. Another charcoal iron furnace has been lighted, two units now being in blast.

Coke

Shipments of by-product foundry coke are moderately lighter, reflecting a smaller melt. This change does not appear to have reached many jobbing foundry units, automotive and farm implement work being affected most.

Reinforcing Bars

Shop operations range from 40 to 50 per cent of capacity, but backlogs are light and road work is the only promising feature in the market. Illinois will open bids on slab and bridge work on May 22 and 29. Cook County, Ill., is also ready to come into the market. Housing projects for Chicago are still under discussion, the promoters not yet having been able to overcome the opposition of property owners. Estimating departments are very low on work.

Cast Iron Pipe

Little change has taken place in this market during the first three weeks of May. Public work on which figures have not been taken is dragging and private business is almost an unknown quantity. Chicago has placed 480 tons of 24-in. pipe and will soon open bids on its inquiry for 1100 tons of 12 to 16-in.

Rails and Track Supplies

The Chesapeake & Ohio has ordered 35,000 tons of rails, bringing to a close the business that the trade bid for when rail prices were marked down. Illinois Steel Co. will roll 15,085 tons, Inland 11,900 tons, Carnegie 4515 tons, and Bethlehem 3500 tons. Chicago rail mills are holding output at 40 per cent of capacity and books are sufficiently heavy to sustain this rate until the end of June, though there is no assurance that this course will be followed. Track accessories are moving in good volume on contract. New business is spotty and usually of car-lot proportions.

Structural Material

Awards remain light, the total for the past week being about 3500 tons. Fresh inquiries total 5000 tons, but this is far short of the needs of local shops if current operations are to be maintained. New work has been falling irregularly of late, some shops being fairly well supplied with work and others being badly in need of tonnage. Specifications to mills for structural materials are a shade higher and it is noticeable that most releases are for tonnages that are to go into State bridge work. The outstanding award is 1200 tons for an office building at Houston, Tex., for the Humble Oil & Refining Co. Important among inquiries is 2000 tons for a dam to be built in the Northwest.

Plates

Some additional plate tonnage will soon reach mills for 200 gondola cars that have been ordered by the Central of Georgia. On the Pacific Coast over 5000 tons of plates will be used for penstocks for a dam to be built at Grand Coulee, Wash. Shipments of materials for old car orders are well advanced. Tank business is light and specifications from fabricators are at a low point.

Bars

Specifications for bar mill products are slackening, this being especially noticed in the movement of forging bars to local shops that feed to the Detroit area. Farm implement manufacturers, affected by the lateness of the season and the drought, are slowly revising production schedules downward. The character of business being done with miscellaneous consumers indicates a greater degree of spottiness than has heretofore been noticed.

Wire Products

Mill output, which has dropped several points, is most seriously affected by the recession in automobile production, though the sluggishness of business in the drought area is also a major contributing factor. Neither railroads nor public utilities have seen fit to step into the market in a broad way and users of magnet wire are taking limited quantities.

Sheets

Output is steady at about 75 per cent of capacity. This rate is strongly influenced by the character of business, which is not well balanced in relation to some producers' equipment. Some orders are now being turned back, it being certain that they cannot be filled by the end of the quarter. This situation exists in certain grades of automobile sheets, galvanized sheets (which are being taken heavily by the roofing trade for stock), and hot-rolled annealed sheets.

Scrap

Although there is some prospect that mill buying may again develop in the near future, still there seems to be no bottom so far as prices are concerned. The market on the whole is off 25c. to 50c. a ton and prices remain weak. Old orders are fairly well covered and in some instances dealers are paying top prices for grades that will pass mill inspections. Most of those engaged in the scrap trade are reconciled to a quiet summer, but they feel that the washout in the coming months will build for a better market in the fall.

Steel Releases Only Moderate at New York

Fears of Speculative Accumulations Subside — Ten-Day Waiting Period to Be Reduced to Three Days, According to Report

NEW YORK, May 22.—If the final month of this quarter is to be a period of great pressure on the mills for shipments, there are as yet few evidences of such impending tension. The strike threat of the Amalgamated Association of Iron, Steel and Tin Workers has stimulated tin plate releases somewhat and a few makers of sheets and strip steel are rather heavily booked for the remainder of the quarter, but in all other respects the market is devoid of momentum. In the view of some observers the moderate tempo of business is a good sign. Those who feared heavy specifying by consumers at the expense of next quarter's production are now satisfied that speculative accumulations will not be excessive. While staple materials like tin plate are being stocked rather freely, buyers are taking no chances on special materials which might have to be scrapped in part because of unforeseen changes in their use. Meanwhile bookings of railroad and structural materials, which are not governed by the code regulation restricting deliveries to a calendar quarter, assure the industry a fairly good backlog for the third quarter.

Proposed changes in the code have not yet been announced, but it is now reported that the waiting period after price changes, instead of being abolished, will be reduced from 10 days to 3 days. It is also stated that prices on steel delivered by water will be determined by deducting standard arbitrary allowances from the all-rail delivered prices.

Makers of stainless steel have now standardized their grades of this product. The commonest grade, now generally designated as Stainless Steel No. 302, has been given a somewhat more flexible analysis as follows: chromium, 17 to 19 per cent; nickel, 7 to 9 per cent; carbon, over 0.08 to 0.20 per cent. Prices of bars, plates, sheets and cold-rolled strip in this grade are unchanged, but the price of hot-rolled strip has been advanced from 20c. to 20¾c. a lb.

Pig Iron

Sellers report a better distribution of shipments this month than last, but June releases are expected to be particularly heavy. In all probability current price schedules will be extended for the third quarter when books are opened on June 1. June orders for third quarter shipment are expected to be very slack, however, and many furnaces do not anticipate much inquiry before early September. New sales in this territory last week amounted to 550 tons of foundry and specialty grades for prompt shipment, as compared with 525 tons in the preceding period, and 425 tons a fortnight ago. The daily output of the Troy furnace is being steadily shipped out against contracts previously made, and actual orders now on the books preclude any large accumulation of stocks at the furnace for a number of months.

Reinforcing Steel

There were no tonnage awards in this territory last week, and very little business was done with contractors on small jobs. The present quietness will probably continue for some time as plans for several large projects are not yet out.

Scrap

This buying market has a softer tone in sympathy with weakness throughout the country, but barge quotations on heavy melting steels remain unaltered on the strength of a moderate volume of coverage by brokers. No. 2 cast is about 25c. lower at $6.75 a ton for shipment to England, whereas the remainder of the list is inactive and quotably nominal. A little fresh export business came into this market last week, but foreign buyers are now more hesitant than in previous periods. The current unsettled condition is a natural outgrowth of the concerted buying strike on the part of domestic mills. There is a possibility, however, that mills may suddenly enter heavy bookings and just as suddenly again ignore the market.

Output Sustained In South

BIRMINGHAM, May 22.—Current pig iron demand is limited to a few spot orders. Shipments continue ahead of those for April. This improvement is not due so much to increased foundry melt as to monthly contract quotas.

Books for the third quarter will likely be opened June 1, and the present base price of $14.50 will continue.

Ten furnaces are in blast, the number being the same as for the past three months.

There are no new developments in the iron mine strike. No ore has been produced since May 4 and the various companies have not taken any public steps toward a settlement. The furnaces are being supplied with ore from the large stocks on hand when the strike started. It is likely that some action will be started after the adoption of the ore code, now being discussed in Washington. The National Guard remains on duty at a number of points.

Steel

There is only limited activity in the steel market, mostly in sheets and wire products. Bars, shapes and plates are dragging. Specifications against contracts are good but not up to what was expected.

Present prices will doubtless prevail for the third quarter when books are opened around June 1.

Fifteen open-hearths were operated last week and the same number will be worked this week.

Business Looks Up In New England

BOSTON, May 22.—Current buying of pig iron is in carlots and amounts to little in the aggregate. Furnace representatives are now of the opinion that business in June will be better than was expected earlier this month. Several foundries have intimated they will be in the market then. Specifications against outstanding contracts are quite satisfactory despite the fact there has been a further decline in the general New England melt.

The scrap market is rather flat and prices are purely nominal. Stocks in yards of New England consumers generally are getting quite low, and some buying of breakable cast, No. 2 steel, bundled skeleton and machinery and textile cast will probably develop around June 1.

Business in cast iron pipe is confined largely to small lots, but in the aggregate is fairly large. Prices are firm. Towns and cities that bought pipe earlier in the year and held up shipments are now calling for deliveries.

Between 8000 and 10,000 tons of fabricated steel and some 3000 tons of reinforcing steel bars, bids on which have been placed, have yet to be closed.

Miscellaneous Demand Well Maintained at Cleveland

But Diminishing Orders from Automotive Industry Cause Drop in Ingot Output—Lake Ore Prices Reestablished

CLEVELAND, May 22.—Miscellaneous demand for finished steel is well maintained and business so far this month except with mills making sheets and strip is holding up to the April volume. Many consumers want their steel delivered promptly, indicating that as yet there is not much stocking up by buyers.

Ingot output in the Cleveland-Lorain territory declined two points this week to 65 per cent of capacity. Some further reduction is probable.

Fear on the part of buyers of a strike in the steel industry causing delay in deliveries is forcing out some specifications. Orders for sheets and strip continue to come from the automotive industry in considerably reduced volume caused by the curtailment in production schedules. Strikes and other threatened labor troubles are retarding the sales of automobiles to workmen who are faced with the danger of enforced unemployment. Considerable steel contracted for by the automotive industry for the second quarter is expected to be cancelled. The saving in cost of steel taken out before the end of June will not cause some of the automobile companies to stock up heavily. Instead, they will take only enough to cover July requirements.

The Chesapeake & Ohio has placed 35,000 tons of rails, which evidently concludes this year's rail purchases by railroads centering here.

Lake Superior ore prices that have prevailed for several years have finally been re-established for the season. Steel mills are preparing to open their books June 1 for third quarter contracts at present prices. The scrap market has declined further.

Pig Iron

Present prices will prevail for the third quarter with leading Lake furnace producers who will open their books June 1 for contracts covering the coming quarter. Had a price change been made to go in effect on that date it would have been necessary to have filed it by May 21. Tonnage sold since the last price advance became effective has been negligible. Shipping orders continue good although demand from the automotive industry has tapered off somewhat. Heavier shipments are looked for in June, as consumers are expected to take out about all the iron covered by their present contracts taken at the old prices.

Iron Ore

Ore prices for the season were definitely established May 21 at the same schedules that prevailed last year by four open market sales involving several hundred thousand tons. The sales were made by a leading local ore firm. Some consumers having long-term contracts also made definite commitments for the season at the same prices. These placed orders for considerably more tonnage than they took last year. This will be the sixth year that the same prices will prevail, these prices having been established in 1929. The season's prices are: Old Range Bessemer, $4.80; Old Range non-Bessemer, $4.65; Messabi Bessemer, $4.65; Messabi non-Bessemer, $4.50; high phosphorus ore, $4.40.

Bars, Plates and Shapes

Activity in the structural field at present is largely in highway and railroad bridge work. The New York Central has placed 1223 tons for grade crossing elimination work in Palmyra, N. Y., and fabricators are figuring on several bridge projects outside of Ohio. A local industrial plant has been placed requiring 135 tons. Specifications for merchant bars continue good. Reinforcing bars are very quiet. Miscellaneous demands for plates is fair.

Rails

The Chesapeake & Ohio Railroad has placed 35,000 tons of rails which were divided among four mills. These are to be shipped before Aug. 31, the deadline date set for deliveries at the reduced price. Track fastenings for these rails were purchased several weeks ago.

Bolts and Nuts

Shipments so far this month have held up to about the same volume as in April. However, orders from the motor car makers have declined somewhat. While no action has yet been taken on third quarter prices, it seems rather probable that the 70 per cent discount will remain in effect.

Sheets

Specifications from the automotive industry show a further decline and there was some curtailment in finishing mill operations this week. Demand from the refrigerator and stove industries has not lessened. Mill schedules are well filled for June with galvanized sheets and long terne plate as well as wide cold rolled sheets. Generally deadline dates for accepting specifications have not been set. Some cancellations are expected.

Strip Steel

The recent reduction in specifications from the motor car industry is still in evidence and there is a probability that considerable tonnage covered by second quarter contracts will be cancelled. Some automotive interests do not expect to stock heavily in June, limiting their orders for late-in-the-month deliveries to their July requirements. A fair demand has developed from Detroit manufacturers. Cooperage hoop is active.

Cap and Set Screws

Manufacturers have adopted a new price set-up providing quantity differentials for consumers and allowing distributers two additional 10 per cent deductions from the regular base discount that is quoted to small package lot consumer buyers. There is no change in recently quoted discounts, which now aplpy to the small-lot consumer order. Under the new schedule there are three sets of discounts for the larger consumers for screws taken in bulk and in one shipment. Manufacturers have attempted to make prices conform with costs. The cap screw code has been approved and signed and makers have been asked to file their prices with the United States Cap Screw Service Bureau, Code Authority, by May 23. The machine screw industry is now operating under a code which went into effect May 19. Its code authority is the Machine Screw Service Bureau.

Scrap

Scrap is a drug on the market and in the absence of any new demand prices have declined further 50c. a ton on heavy melting steel and compressed sheet steel and 25c. a ton on blast furnace grades. Some of the mills have little scrap due on contracts but their stocks are large and new buying is not expected this month. Consumers are still restricting shipments. Considerable scrap, mostly from the Detroit territory, is coming to Cleveland by water.

Service Machine Co., 750-760 Broadway, Elizabeth, N. J., have appointed the Production Machinery Sales Co., Inc., in Detroit, as their sales representatives for their line of presses, dies, tools and special machinery.

Steel Production Drops In Philadelphia District

Specifications Slightly Heavier at Some Mills, but Sheet and Tin Plate Releases Are Lower — Scrap Declines Sharply

PHILADELPHIA, May 22.—Although specifications for heavy hot-rolled products going principally to the railroads and shipyards seem to be slightly heavier, releases on sheets, tin plate and wire products are lighter and raw steel production in the eastern Pennsylvania district has declined a point to 45 per cent of capacity. Although this interrupts an upward movement which has extended over several weeks, mill backlogs are such that no sharp recession seems to be in prospect before July 1. Even than releases from the railroads will continue and specifications from the shipyards and the building industry will not be interrupted.

Movement of reinforcing bars is at the best rate of the year to date and highway construction as well as other public works projects will be extended through the summer. The structural steel market is quiet so far as new jobs are concerned. Plates for ship and freight car construction are in good demand, but there is little miscellaneous demand.

As is the case in other steel making districts, the scrap market has broken sharply in the last week. Consumers are not buying, but mill offering prices are definitely lower. Pig iron is also very quiet, but shipments are fairly well maintained and furnace backlogs are fairly satisfactory.

Pig Iron

The market is without feature and activity is confined almost entirely to small shipments against old contracts. Foundry operations in the district have failed to improve materially and comparatively large stocks are being carried by the leading users. Shipments from the Troy, N. Y., stack which resumed production recently are beginning to reach two or three large users in this territory.

Bars, Plates and Shapes

This market is making a relatively good showing because of undiminished shipments to the railroads and shipyards. Most of the eastern carriers have car repair or car building programs in progress and movement of track accessories is also well sustained. Plates for boiler fabrication are rather quiet. Reinforcing bars are in good demand for road work and other PWA projects and a little private work is under way. The structural steel market is without feature, the only large job before the trade being the third section of the Delaware River bridge subway approach, which will require 3200 tons. The Pennsylvania Railroad will take bids May 29 on 400 tons for a platform shelter service building at its Thirtieth Street station in Philadelphia.

Sheets

With the requirements of automobile body builders tapering rather sharply, this market is proving rather disappointing. Mills are having difficulty in persuading consumers to specify fully against contracts taken last month and are still seeking tonnage for early June rolling.

Imports

The following iron and steel imports were received here last week: 516 tons of pig iron from British India; 473 tons of chrome ore from British South Africa; 391 tons of pig iron and 150 tons of ferromanganese from Norway; 99 tons of sponge iron, 4 tons of steel bars and 2 tons of steel billets from Sweden.

Scrap

In spite of the fact that mill purchases of scrap have been negligible the market has slipped off rather sharply on the strength of dealer offering prices. One consumer was able to buy a small tonnage of No. 1 heavy melting steel at $10.25, and larger lots would probably be available at $10.50. Practically all of the other grades have also declined and even the export market is weaker. Exceptions must be noted in the case of railroad specialties and blast furnace material.

Labor Trouble Disturbs Cincinnati District

CINCINNATI, May 22.—Labor disturbances are keeping the district market uncertain. Pig iron buying is at a minimum, melters refusing material because of business uncertainties. Foundries catering to office device and valve manufacturers are restricting operations because of strikes in customers' plants. Machine tool foundries are without noticeable business, but stove foundries are operating at good rate. Current bookings of pig iron are almost negligible, while inquiry is nil. Shipments against contracts continue at a good pace.

Coke

By-product foundry coke is moving in better volume than last month, but new business is light. Prices on domestic coke are to advance 25c June 1.

Steel

Lighter automotive specifications without corresponding increases in releases from other sources have resulted in lower demands on sheet mills in this district. Rolling schedules slightly under 60 per cent of capacity output are being maintained. Except for some speculative purchases by jobbers, demand for construction steel is featureless. Prices continue steady and it is believed that no change will be made for third quarter.

Scrap

Prices tend weaker as dealers seek to move yard supplies. Bids are nominal, with some sales for application on contracts below the recognized market schedule. Mill buying is lacking, as consumers seek to better their own position before increasing commitments.

Luria Brothers Remove Offices to Philadelphia

LURIA BROTHERS & CO., INC., dealer in scrap iron and steel, is removing its main offices from Reading, Pa., to the Lincoln Liberty Building, Broad and Chestnut Street, Philadelphia, effective May 28. The company's Philadelphia district offices will be consolidated at the same address, while a branch office will be maintained in the Colonial Trust Building, Reading.

Scrap Hits New Low at Detroit

DETROIT, May 22.—With steel mills taking in only meager tonnages of scrap, prices have slipped down another 50c a ton on many items including heavy melting steel and hydraulic bundles. Automotive cast scrap has declined $1 a ton because of the sharp decrease in operations of Michigan foundries. One or two boatloads of old material are being shipped out of Detroit this week but in general users of steel scrap are asking for hold-ups of current contract tonnages. Dealers are anticipating another drop in prices the coming week.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

	Soft Steel Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago or Gary	1.95c.
Del'd Philadelphia	2.19c.
Del'd New York	2.23c.
F.o.b. Cleveland	1.95c.
Del'd Detroit	2.05c.
F.o.b. Buffalo	2.00c.
F.o.b. Birmingham	2.05c.
F.o.b. cars dock Pacific ports	2.45c.
F.o.b. cars dock Gulf ports	2.30c.
Rail Steel (For merchant trade)	
F.o.b. Cleveland	1.85c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Pittsburgh	1.80c.
F.o.b. Buffalo	1.90c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Billet Steel Reinforcing (Cut lengths as quoted by distributers)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Cleveland	2.10c.
Del'd Detroit	2.20c.
F.o.b. Youngstown	2.10c.
F.o.b. cars dock Pacific ports	2.60c.
F.o.b. cars dock Gulf ports	2.45c.
Rail Steel Reinforcing (Cut lengths as quoted by distributers)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Chicago	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
Iron	
Common iron, f.o.b. Terre Haute, Ind.	1.75c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Phila.	1.89c. to 1.99c.
Common iron del'd N. Y.	1.93c. to 2.03c.

Steel Car Axles

F.o.b. Pittsburgh	2.65c.
F.o.b. Chicago	2.65c.
F.o.b. Birmingham	2.65c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh	1.85c.
F.o.b. Chicago	1.90c.
F.o.b. Gary	1.90c.
F.o.b. Birmingham	2.00c.
Del'd Cleveland	2.035c.
Del'd Philadelphia	2.035c.
F.o.b. Coatesville	1.95c.
F.o.b. Sparrows Point	1.95c.
Del'd New York	2.13c.
F.o.b. dock cars Pacific ports	2.40c.
F.o.b. cars dock, Gulf ports	2.25c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.85c.
F.o.b. Chicago	1.90c.
F.o.b. Birmingham	2.00c.
F.o.b. Buffalo	1.95c.
F.o.b. Bethlehem	1.95c.
Del'd Cleveland	2.035c.
Del'd Philadelphia	2.035c.
Del'd Philadelphia	2.055c.
Del'd New York	2.1025c.
F.o.b. cars dock, Gulf ports	2.25c.
F.o.b. dock cars Pacific ports (standard)	2.40c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.00c.
F.o.b. Chicago	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base 2.55c. a lb. Delivered price at Detroit is 2.70c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	2.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Cold Finished Bars and Shafting*

	Base per Lb.
Pittsburgh	2.10c.
Chicago	2.15c.
Cleveland	2.15c.
Buffalo	2.20c.
Detroit	2.30c.
Eastern Michigan	2.35c.

* In quantities of 10,000 to 19,000 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.00c.
No. 10, f.o.b. Gary	2.10c.
No. 10, del'd Detroit	2.20c.
No. 10, del'd Phila.	2.29c.
No. 10, f.o.b. Birmingham	2.15c.
No. 10, f.o.b. dock cars Pacific ports	2.55c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.65c.
No. 24, f.o.b. Gary	2.75c.
No. 24, del'd Detroit	2.85c.
No. 24, del'd Phila.	2.94c.
No. 24, f.o.b. Birmingham	2.80c.
No. 24, f.o.b. dock cars Pacific ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.55c.
No. 10 gage, f.o.b. Gary	2.65c.
No. 10 gage, del'd Detroit	2.75c.
No. 10 gage, del'd Phila.	2.84c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.25c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.15c.
No. 20 gage, f.o.b. Gary	3.25c.
No. 20 gage, del'd Detroit	3.35c.
No. 20 gage, del'd Phila.	3.44c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.25c.
No. 24, f.o.b. Gary	3.35c.
No. 24, del'd Phila.	3.54c.
No. 24, f.o.b. Birgingham	3.40c.
No. 24, f.o.b. dock cars Pacific ports	3.85c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.65c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.20c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.85c.
No. 28, Gary	2.95c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb
All widths up to 24 in., P'gh	2.00c.
All widths up to 24 in., Chicago	2.10c.
All widths up to 24 in., del'd Detroit	2.20c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.80c.
F.o.b. Cleveland	2.80c.
Del'd Chicago	3.08c.
F.o.b. Worcester	3.00c.

Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland	3.20c.
F.o.b. Worcester	3.60c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

	To Manufacturing Trade Per Lb.
Bright wire	2.30c.
Spring wire	3.20c.

To Jobbing Trade

Extras of 10c. a 100 lb. on joint carloads and 30c. on pooled cars and less-than-carload lots are applied on all merchant wire products. An allowance of $2 a ton is made to jobbers on straight, mixed or joint carloads; $3 a ton is allowed on less-than-carload shipments.

	Base per Keg
Standard wire nails	$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	$4.60
16 gage and finer	5.10

	Base per 100 Lb.
Smooth annealed wire	$2.45
Smooth galvanized wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel: Inches	Black	Galv.	Wrought Iron: Inches	Black	Galv.
⅛	51½	29½	⅛	+9	+38
¼ to ⅜	53½	35	¼ & ⅜	+11½	+21½
½	58½	47	½	31½	15
¾	62	52	¾	36½	20½
1 to 3	64	55	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	60	51	2	37	22½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	33½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	32½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	44	1½ in.—1¾ in.	44
2½ in.—2¾ in.	40	2 in.—2¼ in..	13
3 in.	44	2½ in.—2¾ in.	16
3¼ in.—3½ in.	47	3 in.	17
4 in.	49	3¼ in. to 3½ in.	18
4½ in. to 6 in.	42	4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five. Exception: On 1½ to 1¾-in. charcoal iron tubes no supplementary discounts are granted, and the discount for 10,000 lb. to a carload is 4 points under base and for less than 10,000 lb. 8 points under base.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	68	3 in.	38
1¼ to 1½ in.	68	3¼ to 3½ in.	41
1¾ in.	68	4 in.	43
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot-Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	47
2½ and 2¾ in.	40	4 in.	49
3 in.	44	4½, 5 and 6 in.	42

In the case of all sizes except 1-in. to 1¾-in. cold-drawn boiler tubes supplementary discounts of two 5 per cents are allowed on carload lots. On quantities up to 10,000 lb. the base discount is reduced 10 points and a supplementary discount of 5 per cent only is allowed. On quantities 10,000 lb. to 24,999 lb. the base discount is reduced 6 points and a supplementary discount of 5 per cent only is allowed. On 25,000 lb. to a carload the base discount is reduced 2 points and supplementary discounts of two 5 per cents are allowed.

On 1 to 1¾-in. cold-drawn boiler tubes, there are no supplementary discounts. On quantities up to 10,000 lb. the base discount is reduced 12 points; on 10,000 lb. to 24,999 lb., it is reduced 8 points; on 25,000 lb. to a carload it is reduced 2 points.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 3.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, 60-lb. and heavier, per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ in. and smaller	2.40
Spikes, boat and barge	2.40
Tie plates, steel	1.90
Track bolts, to steam railroads	3.55
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh.	70, 25 and 10
Stove bolts in packages, Ch'go.	70, 25 and 10
Stove bolts in packages, Cleveland,	70, 25 and 10
Stove bolts in bulk, P'gh	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.00
F.o.b. Chicago	3.10
F.o.b. Birmingham	3.15

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 180 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screw, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws cut and oval point	75 and 10
Milled studs	65

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	32c.
Hot-rolled strip	20½c.
Cold-rolled strip	27c.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Youngstown, Chicago, Gary, Buffalo, Cleveland, Birmingham.

	Per Gross Ton
Rerolling	$29.00
Forging quality	34.00

Delivered Detroit

Rerolling	$32.00
Forging quality	37.00

Sheet Bars

F.o.b. Pittsburgh, Youngstown, Cleveland, Chicago, Buffalo, Canton, Sparrows Point.

	Per Gross Ton
Open-hearth or Bessemer	$30.00

Skelp

F.o.b. Pittsburgh, Youngstown, Chicago, Buffalo, Coatesville, Pa., or Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$38.00
Cleveland	38.00
Chicago	39.00
Birmingham	41.00
Youngstown (del'd)	39.00

ALLOY STEEL BLOOMS, BILLETS AND SLABS

F.o.b. Pittsburgh, Chicago, Buffalo, Massillon, Canton or Bethlehem.
Base price, $51 a gross ton.
Price del'd Detroit is $54.

CARBON STEEL FORGING INGOTS

F.o.b. Pittsburgh, Youngstown, Cleveland, Gary, Chicago or Birmingham.
Uncropped, $31 per gross ton.

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.85
Furnace, f.o.b. Connellsville Prompt	$4.60 to 5.60
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.73c.
No. 5 industrial fuel oil	3.00c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	5.75c.
No. 4 industrial	5.50c.
No. 5 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$44.00 to $45.00
4-in., del'd Chicago	47.00 to 48.00
6-in. and larger, del'd New York	43.00
4-in. del'd New York	48.00
6-in., and larger, Birmingham,	36.00 to 37.00
4-in. Birmingham	39.00 to 40.00

Class "A" and gas pipe, $3 extra

Pig Iron, Ores, Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	....
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17 50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J. From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati From Hamilton, Ohio	19.51	19.51	19.01	21.65
Canton, Ohio From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind. From Chicago	20.55	20.55	....	....
Milwaukee From Chicago	19.50	19.50	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.26	20.26	....	....
Kansas City From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50
Johnson City, Tenn. 19.50
Del'd Chicago 25.15

GRAY FORGE PIG IRON

Valley furnace $17.50

CHARCOAL PIG IRON

Lake Superior furnace $21.00
Delivered Chicago 24.04
Delivered Buffalo 24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carload)	$85.00
Domestic, 80%, seaboard, (ton lots)	92.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$22.25	12%	$29.25
7%	23.25	13%	30.75
8%	24.25	14%	32.75
9%	25.25	15%	33.75
10%	26.25	16%	35.25
11%	27.75	17%	36.75

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$27.25	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1½ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.40 to $1.50
Ferrotungsten, less carloads	1.50 to 1.60
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52%	24c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$17.50 to $18.00
Tungsten, domestic scheelite, delivered†	$17.25

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†No scheelite available at this bid price.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$17.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$17.50 to 18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00 to $12.50
No. 2 heavy melting steel	11.00 to 11.50
No. 2 railroad wrought	12.00 to 12.50
Scrap rails	12.50 to 13.00
Rails 3 ft. and under	15.50 to 16.00
Sheet bar crops, ordinary	15.00 to 15.50
Compressed sheet steel	12.50 to 13.00
Hand bundled sheet steel	10.50 to 11.00
Hvy. steel axle turnings	11.50 to 12.00
Machine shop turnings	8.00 to 8.50
Short shov. turnings	8.00 to 8.50
Short mixed borings and turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Cast iron carwheels	12.00 to 12.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	12.50 to 13.00
Railr. knuckles and couplers	15.00 to 15.50
Rail. coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet crops	16.00 to 16.50
Low phos. sheet bar crops	15.50 to 16.00
Low phos. plate scrap	14.50 to 15.00
Low phos. punchings	15.00 to 15.50
Steel car axles	16.00 to 16.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.50 to $11.00
Automobile hvy. melt. steel	9.75 to 10.25
Shoveling steel	$10.50 to $11.00
Hydraulic comp. sheets	9.50 to 10.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	9.00 to 9.50
Rolled carwheels	11.25 to 11.75
Railroad tires	11.25 to 11.75
Railroad leaf springs	11.25 to 11.75
Axle turnings	8.75 to 9.25
Steel couplers and knuckles	11.00 to 11.50
Coil springs	11.25 to 11.75
Axle turnings (elec. fur.)	9.50 to 10.00
Low phos. punchings	11.50 to 12.00
Low phos. plates, 12 in. and under	11.50 to 12.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	6.00 to 6.50
Rerolling rails	11.50 to 12.00
Steel rails, less than 3 ft.	11.50 to 12.00
Steel rails, less than 2 ft.	12.00 to 12.50
Angle bars, steel	11.25 to 11.75
Cast iron carwheels	10.75 to 11.25
Railroad malleable	10.75 to 11.25
Agricultural malleable	9.00 to 9.50

	Per Net Ton
Iron car axles	$12.25 to $12.75
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	9.25 to 9.75

No. 2 busheling	$3.75 to	$4.25
Locomotive tires, smooth	9.50 to	10.00
Pipe and flues	5.00 to	5.50
No. 1 machinery cast	8.50 to	9.00
Clean automobile cast	8.50 to	9.00
No. 1 railroad cast	8.00 to	8.50
No. 1 agricultural cast	7.00 to	7.50
Stove plate	6.50 to	7.00
Grate bars	6.00 to	6.50
Brake shoes	7.50 to	8.00

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	....	$10.50
No. 2 heavy melting steel	$8.00 to	8.50
No. 1 railroad wrought	12.00 to	12.50
Bundled sheets	....	9.50
Hydraulic compressed, new	....	10.00
Hydraulic compressed, old	7.00 to	7.50
Machine shop turnings	6.50 to	7.00
Heavy axle turnings	9.00 to	9.50
Cast borings	5.50 to	6.00
Heavy breakable cast	10.50 to	11.00
Stove plate (steel works)	8.50 to	9.00
No. 1 low phos. heavy	....	15.00
Couplers and knuckles	14.00 to	14.50
Rolled steel wheels	14.00 to	14.50
No. 1 blast furnace	5.50 to	6.00
Spec. iron and steel pipe	....	9.00
Shafting	....	16.00
Steel axles	....	14.50
No. 1 forge fire	10.00 to	10.50
Cast iron car wheels	....	12.50
No. 1 cast	12.00 to	12.50
Cast borings (chem.)	12.00 to	14.00
Steel rails for rolling	....	13.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to	$10.50
No. 2 heavy melting steel	9.50 to	10.00
Compressed sheet steel	9.50 to	10.00
Light bundled sheet stampings	7.50 to	8.00
Drop forge flashings	9.50 to	10.00
Machine shop turnings	8.00 to	8.50
Short shoveling turnings	8.00 to	8.25
No. 1 busheling	9.50 to	10.00
Steel axle turnings	9.00 to	9.50
Low phos. billet crops	14.25 to	14.75
Cast iron borings	8.00 to	8.50
Mixed borings and short turnings	8.00 to	8.50
No. 2 busheling	8.00 to	8.50
No. 1 cast	12.00 to	12.50
Railroad grate bars	7.50 to	8.00
Stove plate	7.00 to	7.50
Rails under 3 ft.	15.00 to	15.50
Rails for rolling	16.50 to	17.00
Railroad malleable	12.00 to	12.50
Cast iron carwheels	....	12.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting scrap	10.00 to	10.50
Scrap rails	11.00 to	11.50
New hydraul. comp. sheets	10.00 to	10.50
Old hydraul. comp. sheets	9.00 to	9.50
Drop forge flashings	10.00 to	10.50
No. 1 busheling	10.00 to	10.50
Hvy. steel axle turnings	8.00 to	8.50
Machine shop turnings	5.50 to	6.00
Knuckles and couplers	13.00 to	13.50
Coil and leaf springs	13.00 to	13.50
Rolled steel wheels	13.00 to	13.50
Low phos. billet crops	13.00 to	13.50
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
No. 2 busheling	6.50 to	7.00
Steel car axles	12.00 to	12.50
Iron axles	12.00 to	12.50
No. 1 machinery cast	12.00 to	12.50
No. 1 cupola cast	10.00 to	10.50
Stove plate	9.50 to	9.75
Steel rails, 3 ft. and under	13.50 to	14.00
Cast iron carwheels	11.50 to	12.00
Industrial malleable	11.50 to	12.00
Railroad malleable	11.50 to	12.00
Chemical borings	8.50 to	9.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	....	$10.00
Scrap steel rails	....	9.00
Short shoveling turnings	....	5.50
Stove plates	$7.00 to	7.50
Steel axles	10.50 to	11.00
Iron axles	10.50 to	11.00
No. 1 railroad wrought	....	7.00
Rails for rolling	....	10.50
No. 1 cast	9.00 to	9.50
Tramcar wheels	9.00 to	9.50
Cast iron borings, chem.	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.75 to	$9.25
No. 1 heavy melting	8.50 to	9.00
No. 2 heavy melting	7.50 to	8.00
No. 1 locomotive tires	9.50 to	10.00
Misc. stand-sec. rails	9.00 to	9.50
Railroad springs	10.75 to	11.25
Bundled sheets	7.25 to	7.75
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	6.00 to	6.50
Cast iron borings and shoveling turnings	4.75 to	5.25
Rails for rolling	10.00 to	10.50
Machine shop turnings	4.75 to	5.25
Heavy turnings	5.50 to	6.00
Steel car axles	10.50 to	11.00
Iron car axles	13.00 to	13.50
No. 1 railroad wrought	5.50 to	6.00
Steel rails less than 3 ft.	11.00 to	11.50
Steel angle bars	9.00 to	9.50
Cast iron carwheels	8.00 to	8.50
No. 1 machinery cast	9.00 to	9.50
Railroad malleable	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Agricult. malleable	9.00 to	9.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$7.00 to	$7.25
Scrap T rails	7.00 to	7.25
No. 2 steel	5.50 to	5.75
Breakable cast	6.25 to	6.50
Machine shop turnings	....	2.80
Bundled skeleton, long	5.00 to	5.25
Forge flashings	5.00 to	5.25
Blast furnace scrap	2.50 to	3.00
Shafting	11.00 to	11.25
Steel car axles	10.50 to	11.00
Wrought pipe	5.00 to	5.25
Cast iron borings, chemical	8.00 to	8.50
Stove plate	....	6.50

Per gross ton delivered consumers' yards:

Textile cast	$8.75 to	$9.00
No. 1 machinery cast	9.50 to	10.00
Railroad malleable	11.00 to	11.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	*$7.50 to	†$8.50
No. 2 heavy melting steel	*6.00 to	†7.00
Heavy breakable cast	7.50 to	8.00
No. 1 machinery cast	....	8.00
No. 2 cast	6.25 to	6.75
Stove plate	....	6.00
Steel car axles	10.75 to	11.50
No. 1 railroad wrought	7.50 to	8.00
No. 1 yard wrought, long	6.50 to	7.00

*For direct car loading only.
†Loading on barge.

Spec. iron and steel pipe	$4.50 to	$5.00
Forge fire	5.50 to	6.00
Rails for rerolling	9.50 to	10.00
Short shoveling turnings	3.00 to	4.00
Machine shop turnings	3.50 to	4.00
Cast borings	4.50 to	4.75
No. 1 blast furnace	2.50 to	4.00
Cast borings (chemical)	11.00 to	11.50
Unprepared yard iron and steel	4.00 to	4.50

Per gross ton, delivered local foundries:

No. 1 machinery cast	$11.25
No. 1 hvy. cast (cupola size)	10.25
No. 2 cast	8.75

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$8.00 to	$8.75
Scrap rails for melting	8.75 to	9.25
Loose sheet clippings	4.50 to	5.00
Bundled sheets	6.25 to	6.75
Cast iron borings	5.75 to	6.25
Machine shop turnings	5.25 to	5.75
No. 1 busheling	6.75 to	7.25
No. 2 busheling	3.25 to	3.75
Rails for rollings	9.25 to	9.75
No. 1 locomotive tires	8.75 to	9.25
Short rails	11.50 to	12.00
Cast iron carwheels	8.00 to	8.50
No. 1 machinery cast	9.25 to	9.75
No. 1 railroad cast	8.75 to	9.25
Burnt cast	6.25 to	6.75
Stove plate	6.25 to	6.75
Agricultural malleable	8.25 to	8.75
Railroad malleable	8.25 to	8.75

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$8.00 to	$8.50
Borings and short turnings	6.00 to	6.50
Long turnings	5.00 to	5.50
No. 1 machinery cast	9.50 to	10.00
Automotive cast	11.00 to	11.50
Hydraul. comp. sheets	8.00 to	8.50
Stove plate	7.00 to	7.50
New factory busheling	7.00 to	7.50
Old No. 2 busheling	5.00 to	5.50
Sheet clippings	4.00 to	4.50
Flashings	7.00 to	7.50
Low phos. plate scrap	8.50 to	9.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.20c.
Structural shapes	3.20c.
Soft steel bars and small shapes	3.00c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.35c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.55c.
Galv. sheets (No. 24), 25 or more bundles	4.10c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 counts, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70c.
Wire, galv. soft, base per 100 lb.	*2.925c.
Common wire nails, per keg	*2.834c.
Cement coated nails, per keg	*2.834c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.
*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	2.90c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.50c.
Flates and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	3.30c.
Hoops (No. 14 gage and lighter)	3.20c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.45c.
Hot-rolled sheets (No. 10)	2.85c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3.50c.
Rivets boiler (keg lots)	3.60c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head and cap screws	60
Cup point set screws	70
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	70 and 10
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$5.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05c.
Cement c't'd nails, base per keg	3.05c.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.45c.
Structural shapes	3.42c.
Soft steel bars, small shapes	3.32c.
Iron bars	3.32c.
Iron bars, swed. charcoal	6.50 to 7.25c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	3.59c.
Hoops	3.67c.
Bands	3.67c.
Hot-rolled sheets (No. 10)	3.42c.
Hot-rolled ann'l'd sheets (No. 24*)	4.05c.
Galvanized sheets (No. *24*)	4.65c.
Long terne sheets (No. 24)	5.40c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.80c.
Wire, galv. (No. 10)	3.80c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.25

	Per Cent Off List
Machine bolts, cut thread:	
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread:	
Up to ½ in. dia. inclusive	60
Over ½ in. dia.	50
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.49c.
Bars, soft steel or iron	3.29c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Galv. sheets (No. 24)	4.54c.
Hot-rolled sheets (No. 10)	3.44c.
Black corrug. sheets (No. 24)	3.90c.
*Galv. corrug. sheets	4.59c.
Structural rivets	3.84c.
Boiler rivets	3.94c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	60
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.00c.
*Structural shapes	3.00c.
*Soft steel bars, small shapes, iron bars (except bands)	3.00c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.55c.
*Steel bands, No. 12 and 3/16 in., incl.	3.30c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.80c.
†Galvanized sheets (No. 24)	4.40c.
*Hot-rolled annealed sheets (No. 10)	3.20c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.
*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 50 bundles or over.
‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.36c.
Soft steel bars	3.05c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat rolled steel under ¼ in.	3.51c.
Cold-finished strip	†3.20c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 24)	4.76c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.61c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.
†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.25c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c.
Hoops and bands, 3/16 in. and lighter	3.60c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Hot-rolled sheets (No. 10)	3.35c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, 1-in., per 100 lb.	3.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$17.89
4-in.	41.69
Lap-welded steel boiler tubes, 2-in.	16.61
4-in.	38.73

BUFFALO

	Base per Lb.
Plates	3.40c.
Struc. shapes	3.30c.
Soft steel bars	3.10c.
Reinforcing bars	2.10c.
Cold-fin. nuts and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	3.35c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.67c.
Galv. sheets (No. 24)	4.65c.
Bands	3.57c.
Hoops	3.57c.
Hot-rolled unannealed sheets	3.32c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.45c.

BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.42c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.50c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.35c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.55c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel			
Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.60c.
Common wire nails —base per keg	$3.40	$3.25	$3.35
less carload			

All items subject to differentials for quantity.

Cast Iron Pipe

Keene, N. H., has awarded 225 tons of pipe and a smaller tonnage of 6 to 12-in. special castings to Central Foundry Co.

Nutley, N. J., plans 6-in. in several streets to replace present 4-in. water lines.

Ocean Water Co., Ocean City, N. J., will install several new lines for extensions in water system. Program approved by city.

Gloversville, N. Y., asks bids until May 29 for 19,000 ft. for water supply system. Fund of $165,000 has been arranged for this and other waterworks extensions. Morrell Vorman, Inc., 21 North Main Street, is engineer.

Danville, W. Va., plans water pipe line. Charles E. Krebs, Inc., Charleston, W. Va., is engineer.

Mooresfield, W. Va., asks bids until May 31 for pipe for water system. Tauszky & Zagari, Oak Hill, W. Va., are consulting engineers.

North Wilkesboro, N. C., asks bids until June 7 for pipe for water supply. Gilbert C. White Co., Durham, N. C., is consulting engineer.

New Braunfels-Gulf Water Supply Corpn., New Braunfels, Tex., H. L. Atkinson, president, plans main trunk line from city to Corpus Christi, Tex., and vicinity, with branch lines to several communities along route. Cost over $7,000,000. Financing is being arranged through Federal aid.

Fairport, Ohio, will soon take bids for 6-in. for water system; also for pumping station and other water improvements. Fund of $95,000 is available. Lauer Engineering Co., Painesville, Ohio, is consulting engineer.

Chicago has awarded 480 tons of 24-in. to United States Pipe & Foundry Co.

Lexington, Neb., plans water pipe line system. Fund of $50,300 has been arranged for this and other waterworks extensions.

Carlin, Nev., will take bids June 12 on 286 tons of 2 to 14-in.

Los Angeles has taken bids on 80,000 ft. of 12-in., about 3750 tons.

LaCenter, Wash., plans about 12,000 ft. of 2 to 8-in., for water system. Baar & Cunningham, Spalding Building, Portland, Ore., are consulting engineers.

Railroad Equipment

Baltimore & Ohio has ordered air-conditioning equipment for two new light-weight, high-speed, streamline trains from York Ice Machinery Corpn.

Central of Georgia has ordered 200 hopper cars from Pullman Car & Mfg. Corpn.

Chicago, Milwaukee, St. Paul & Pacific has undertaken the construction in its own shops of 50 welded steel streamlined passenger coaches and 25 baggage cars.

RAILS

Chesapeake & Ohio has placed 35,000 tons of rails distributed as follows: 15,085 tons to Illinois Steel Co., 11,900 tons to Inland Steel Co., 4,515 tons to Carnegie Steel Co., and 3,500 tons to Bethlehem Steel Co.

Pipe Lines

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 29 for 4600 ft. galvanized welded steel pipe (Schedule 2553) for Charleston, S. C., Navy Yard.

General Purchasing Officer, Panama Canal, Washington, asks bids until May 31 for quantity of steel or iron pipe (Schedule 2964).

Rio Grande Public Service Corpn., Rio Grande City, Tex., is considering welded steel pipe line to Brownsville, Tex., and vicinity, about 100 miles, for furnishing natural gas from Starr County fields to communities along route. Distributing pipe line systems are planned. Cost over $500,000.

United States Engineer Office, Manufacturers' Exchange Building, Kansas City, Mo., asks bids until June 6 for miscellaneous steel pipe (Proposal 951).

Ogden, Utah, let contract to R. Hardesty Mfg. Co., Denver, for 1000 ft. of 24-in. for water supply, replacing present wood stave pipe.

Union Oil Co. of California, Inc., Mills Building, San Francisco, has authorized new welded steel pipe line from Weed Patch oil field district to refinery at Oildale, Cal., about 14 miles, for crude oil. Cost about $125,000.

Wenatchee, Wash., has voted bonds in amount of $1,200,000 to finance construction of 26 miles of pipe. Loan and grant will be asked from PWA.

Drain, Ore., will take bids June 4 on a three-mile pipe line with wood and steel alternates.

Aladdin Gas & Oil Co., Ltd., Regina, Sask., I. W. Rosborough in charge, is considering welded steel pipe line from Pilot Butte gas fields, Sask., to Regina and vicinity. Cost over $200,000.

Crede, Colo., has awarded 1200 tons of pipe for a water line to Thompson Mfg. Co., Denver.

Trade Notes

Star Tool & Mfg. Co., Inc., Bridgeport, Conn., recently removed its office and plant from 170 Cherry Street to larger quarters at 172 Wade Street. Company manufactures tools, dies, special machinery, stampings and wire formed products. J. Rusnap is president.

Reynolds Metals Co. has erected new plant in Louisville, Ky., designed solely for the production of aluminum bronze powder for the paint industry.

Net profit of the International Nickel Co. of Canada, Ltd., for the first quarter of 1934 was $5,049,276, equivalent after provision for quarterly dividends on preferred stock to 31c. a share on the common stock. This compares favorably with a net loss of $80,158 sustained in the corresponding period a year earlier.

CONSISTENT specification of Wyckoff Cold Drawn Bars will assure you of bar stock that is absolutely uniform, unvarying in cross section and readily machinable. Such precision and perfection are obtainable only with COLD DRAWN STEEL BARS, as produced by the Wyckoff organization.

As the largest exclusive manufacturer of Cold Drawn Steels, we are in a position to show how you may effect many worth-while economies in the selection of YOUR steel. Let us cooperate with you.

WYCKOFF DRAWN STEEL COMPANY

GENERAL OFFICES—Ambridge, Penna.
MILLS—Ambridge, Penna. and Chicago, Ill.

Copper Authority Rules Non-Blue Eagle Metal Off the Market until June 15

Heavy Lead Commitments Attracted by Lower Price—Spelter Market Softens as Sales Drop to 1400 Tons—Tin Inactive

NEW YORK, May 22.—the open copper market is almost inactive, and an unsettled selling condition persists in view of the lack of definite elucidation on the part of the copper authority regarding important market policies. Late this afternoon the copper code authority announced that the period in which non-Blue Eagle copper will not be sold by the industry has been extended to June 15. Until that time, therefore, Blue Eagle quotations will rule for all transactions. The current market is unaltered at 8.50c. a lb. for electro, delivered Connecticut valley, and 8.50c. and 8.62½c. for Lake delivered in the West and East respectively. In order to maintain an orderly liquidation of stocks, the copper authority has notified all holders of metal to report their tonnages immediately if any participation in sales allotments is desired. The inaction here has naturally been reflected in the European markets, and sales during the weekly period were very light. Several parcels traded this morning established the market about 15 points down at 8.20c. c.i.f. usual Continental ports. Copper is going into consumption more freely in Europe, and it is indicated that Germany's embargo will soon be partially lifted. However, strict allotments will be made, and this country's share may only be about 20,000 tons annually. Such an enactment would constitute a serious reduction, as over 10,200 tons of American copper was sold in Germany in the January-March period. The statistical position of the metal here continues to slowly improve as stocks were reduced 19,500 tons in April. Primary and secondary production totaled 30,000 tons, and domestic deliveries were 43,500 tons as compared with 42,500 tons in March.

Tin

London and Far-East quotations opened this morning slightly higher, and New York offerings were consequently up about 25 points to 53.40c a lb. as compared with a week earlier. No domestic business developed during the week, therefore the market here continues to be exceedingly dull. A steady strengthening in the price might serve to force in some business, but any definite trend will probably not be evidenced until some decision is made abroad regarding the proposed buffer pool. So far no announcement has been made concerning any action which might have been taken at the Paris meeting of the International Tin Committee on May 16.

Zinc

Price weakness in the ore fields has not as yet been transmitted to the spelter market, but it is probable that the present 4.35c., East St. Louis, figure could be shaded on desirable business. Of the 1400 tons sold last week practically all was for nearby delivery at 4.35c., as compared with 2300 tons in the preceding period and 2600 tons sold two weeks ago. The status of the refined metal market is somewhat uncertain although the current outlook is soft. There has been only a moderate amount of demand in recent months, and the strong position of ore prices and higher conversion costs have worked a hardship on smelters. Now that ore can be secured at a more reasonable figure, it is probable that some sellers will offer Prime Western lower in order to attract more business in their direction. Joplin ore is now quoted at $27 to $29 a ton for flotation grades and $28 to $30 for prime grades, but mines have been reluctant sellers at the lower figure and only 3700 tons changed hands last week. Production was somewhat higher at 7650 tons, shipments totaled 7200 tons, and stocks at the end of the week were estimated about 400 tons up at 13,150 tons.

Lead

Following a protracted period of consumer hesitancy regarding June commitments, principal sellers reduced their prices $5 a ton during the week with the object of securing a heavier volume of forward business. The response at the new 4c. a lb. level has been very satisfactory, and most sellers have not only equaled their daily ore intakes but have partially disposed of past stock accumulations. Consumers' May requirements are now practically covered, and June is slightly more than half sold at 16,000 tons. It is possible that the price may soon return to a 4.15c. basis, now that producers' books are in a better shape due to the 8500 tons of metal which has been attracted into the market by the low 4c. quotation.

The Week's Prices. Cents Per Pound for Early Delivery

	May 16	May 17	May 18	May 19	May 21	May 22
Electrolytic copper, N. Y.*‡	8.25	8.25	8.25	8.25	8.25	8.25
Lake copper, Eastern delivery*	8.62½	8.62½	8.62½	8.62½	8.62½	8.62½
Electrolytic copper, Connecticut†	....	....	....	....	....	....
Straits tin, Spot, N. Y	53.15	53.75	53.25	....	53.37½	53.40
Zinc, East St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Zinc, New York	4.70	4.70	4.70	4.70	4.70	4.70
Lead, St. Louis	4.10	4.00	3.85	3.85	3.85	3.85
Lead, New York	4.25	4.15	4.00	4.00	4.00	4.00

*Blue Eagle copper. †Outside market. ‡Price ¼c. higher in Connecticut valley.

Quotations below cover wholesale lots, f.o.b. New York.

Aluminum, 98-99 per cent, 22.90c. a lb.
Aluminum, remelt No. 12 (grade 2), 15.50c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb.; shot and ingot, remelt electro, 36c. a lb.
Antimony, 8.37½c. a lb. Quicksilver, per flask of 76 lb., $76.
Brass ingots, 85-5-5-5, 8.75c. a lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	55.00c. to 56.00c.
Tin, bar	57.00c. to 58.00c.
Copper, Lake	9.75c. to 10.50c.
Copper, electrolytic	9.50c. to 10.00c.
Copper, castings	9.25c. to 10.25c.
*Copper sheets, hot-rolled	15.50c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.75c.
*Seamless copper tubes	16.75c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	5.75c. to 6.75c.
Lead, sheets	7.75c.
Antimony, Asiatic	9.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.50c. to 33.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	57.25c.
Tin, bar	59.25c.
Copper, Lake	9.50c.
Copper, electrolytic	9.50c.
Copper, castings	9.25c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.00c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	19.50c.
Babbitt metal, high grade	61.25c.
Solder, ½ and ½	35.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.62½c.	7.37½c.
Copper, hvy. and wire	6.37½c.	7.12½c.
Copper, light and bottoms	5.37½c.	6.37½c.
Brass, heavy	3.50c.	4.25c.
Brass, light	3.00c.	3.62½c.
Hvy. machine composition	5.25c.	6.125c.
No. 1 yel. brass turnings	4.37½c.	5.12½c.
No. 1 red brass or compos. turnings	4.25c.	5.25c.
Lead, heavy	3.12½c.	3.62½c.
Zinc	2.50c.	3.125c.
Cast aluminum	10.00c.	11.75c.
Sheet aluminum	12.25c.	13.50c.

Reinforcing Steel

Awards 900 Tons—New Projects 12,000 Tons

AWARDS

Gardner, Mass., 100 tons, storehouse, to Kalman Steel Co.

Taunton, Mass., 175 tons, State highway, to Truscon Steel Co.

Bettendorf, Iowa, 200 tons, bridge footings, to Laclede Steel Co.

Lafayette, Ind., 100 tons, building for Purdue University, to Hugh J. Baker Co.

Tucson, Ariz., 155 tons, State bridge, to an unnamed bidder.

Fort Peck, Mont., 160 tons, filtration plant; general contract to Gjellefold Construction Co., reinforcing steel, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Woburn, Mass., 300 tons, glue factory.

Boston, 280 tons, Stony Brook sewer.

Washington, 200 tons for Panama Canal; bids to be opened June 1.

State of Illinois, 600 tons, road work; lettings on May 22 and May 29.

Champaign, Ill., tonnage being estimated, junior high school.

Onarga, Ill., tonnage not stated, military school.

Chicago, 100 tons, mausoleum.

Los Angeles, 100 tons, city tunnel station bridge; bids under advisement.

Bonneville, Ore., 10,000 tons, power house substructure for dam; bids about July 1.

Bonneville, 400 tons, navigation locks for dam; bids about July 1.

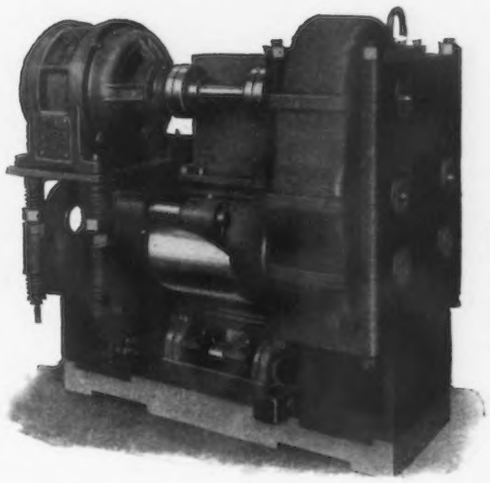
Beehive Coke Output in April Dropped Sharply

PRELIMINARY statistics of the United States Bureau of Mines show April production of beehive coke as 61,400 tons for 25 working days, as compared with the revised estimate of March output as 149,000 tons for 27 working days. During April, 1933, 49,800 tons was produced in 25 working days.

New Watertight Flexible Conduit Fitting

A NEW watertight, vaportight, and explosion-proof conduit fitting that is flexible is being announced by the Pyle-National Co., 1334 North Kostner Avenue, Chicago. Pyle-o-Flex, which is the trade name, is adapted to the safe and economical wiring of gasoline pump and explosion-proof motors in filling stations, bulk gasoline stations, refineries, and for use in grain elevators and other places where dust creates hazardous conditions. It is also adapted to watertight installations on ships, docks, and other exposed locations, for breweries, distilleries, chemical plants, dry cleaning plants, and in swimming pools and similar locations. It withstands vibration, and is capable of withstanding 500-lb. hydrostatic pressure. Each fitting is tested against leaks under water at 50-lb. air pressure.

Self-Contained—
but not self-destructive



ERIE BOARD DROP HAMMERS

Type M Motor Driven Head

No ERIE board drop has ever broken the feet off the motor, broken the motor frame, burned up due to chafed insulation, or had a bit of motor trouble of any sort. The reason lies in the motor mounting illustrated above, with the weight of the motor, and the rebound, both cushioned on springs, and with the drive through two pairs of flexible couplings and a wobbler shaft.

Say goodbye to trouble when you install a Type "M" ERIE. You are not taking on new troubles in exchange for your old, not trading belt expense for motor repairs.

ERIE FOUNDRY COMPANY
ERIE, PENNA., U. S. A.

Detroit 335 Curtis Bldg. | Chicago 549 Washington Blvd. | Indianapolis 335 Postal Station Bldg. | Paris, France 8 Rue de Rocroy

ERIE

On May 29, the Bureau of Supplies and Accounts, Navy Department, will open bids for 85 tons of sheets for stock. Sixty tons will be cold-rolled sheets for the Norfolk Navy Yard and 25 tons will be galvanized corrugated sheets for the Navy Yard at Mare Island.

Steel & Tubes, Inc., 224 East 131st Street, Cleveland, subsidiary of Republic Steel Corpn., has plans maturing in June for new addition, 80x640 ft., including improvements in present mill, with installation of crane runways in welding and strip storage departments. The cost will be about $200,000 with equipment.

Fabricated Structural Steel

Awards in Smaller Volume—New Projects Decline

WITH no lettings of more than 1200 tons, total awards for the week were 11,600 tons, compared with 15,800 tons in the previous week. A viaduct at Palmyra, N. Y., for the New York Central Railroad and an addition for the Humble Oil Co. at Houston, Tex., account for 1200 tons each. New projects of 10,200 tons compare with 15,800 tons last week and 16,310 tons two weeks ago. The substructure for the Bonneville Dam power house at Bonneville, Ore., requiring 1500 tons, is the largest new job reported. Plate awards total 2555 tons. New plate projects of more than 7000 tons include 5150 tons for penstocks for the Bonneville Dam. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Amherst, Mass., 100 tons, college library, to Shippers Car Line Co.

Quincy, Mass., 100 tons, street railway unit, to J. T. Cox Co., Fall River, Mass.

Pawtucket, R. I., 945 tons, grandstand, to New England Structural Co.

Chenango County, N. Y., 210 tons, highway bridge, to Fort Pitt Bridge Works Co.

Troy, N. Y., 360 tons, college laboratory, to Ingalls Iron Works.

Ausable Chasm, N. Y., 110 tons, high school, to Belmont Iron Works.

New York Central Railroad, 1200 tons, viaduct at Palmyra, N. Y., to McClintic-Marshall Corpn.

Queens, N. Y., 240 tons, Grand Central Parkway bridge, to American Bridge Co.

Kings Park, N. Y., 285 tons, hospital building, to National Bridge Co.

Kreischerville, Staten Island, 100 tons, pier, to McClintic-Marshall Corpn.

Ellis Island, N. Y., 260 tons, Government immigration building, to an unnamed fabricator.

Erie Railroad, 255 tons, bridge at North Randolph, to Fort Pitt Bridge Works Co.

Long Branch, N. J., 135 tons, grandstand, to Lehigh Structural Steel Co.

Bordentown, N. J., 710 tons, prison buildings, to Selback Meyer Co. and National Iron Works.

Pennsylvania Railroad, 180 tons, tapered poles for electrification to Washington, to Ingalls Iron Works.

Washington, 125 tons, bridge repairs for Pennsylvania Railroad, to Belmont Iron Works.

SOUTH AND SOUTHWEST

Houston, Tex., 1200 tons, Humble Oil Co. building addition, to McClintic-Marshall Corpn.

Lampasas County, Tex., 200 tons, highway bridge, to McClintic-Marshall Corpn.

Beaumont, Tex., 375 tons, oil derricks, to McClintic-Marshall Corpn.

Calcasieu Paris, La., 175 tons, bridge, to Virginia Bridge & Iron Co.

Little Rock, Ark., 350 tons, building, to Arkansas Foundry & Machine Co.

Crawford County, Ark., 295 tons, bridge, to Kansas City Structural Steel Co.

Las Vegas, N. M., 110 tons, bridge, to American Bridge Co.

CENTRAL STATES

Flint, Mich., 230 tons, AC Spark Plug Co. building, to Taylor & Gaskin Co.

Detroit, 440 tons, brewery building, to Whitehead & Kales Co.

Evart, Mich., 105 tons, bridge, to R. C. Mahon Co.

Kalamazoo, Mich., 300 tons, highway bridge, to Dominion Construction Co.

Springfield, Ohio, 105 tons, bridge, to R. C. Mahon Co.

Cleveland, 135 tons, building for Kleen Kut Mfg. Co., to McClintic-Marshall Corpn.

Missouri Pacific Railroad, 170 tons, bridge at Dupo, Ill., to Stupp Brothers Bridge & Iron Co.

Milwaukee, 550 tons, malt house, to Worden-Allen Co.

Hot Springs, S. D., 300 tons, bridge, to Pittsburgh-Des Moines Steel Co.

WESTERN STATES

State of Colorado, 105 tons, highway work in four counties, to unnamed bidders.

Denver, 175 tons, bridge, to Minneapolis-Moline Power Implement Co.

Wiota, Mont., 315 tons, additional for Missouri River bridge, to McClintic-Marshall Corpn.

San Francisco, 100 tons, girls' high school addition, to Schrader Iron Works.

Pearl Harbor, T. H., 545 tons, storehouse extension at Navy Base, to Belmont Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

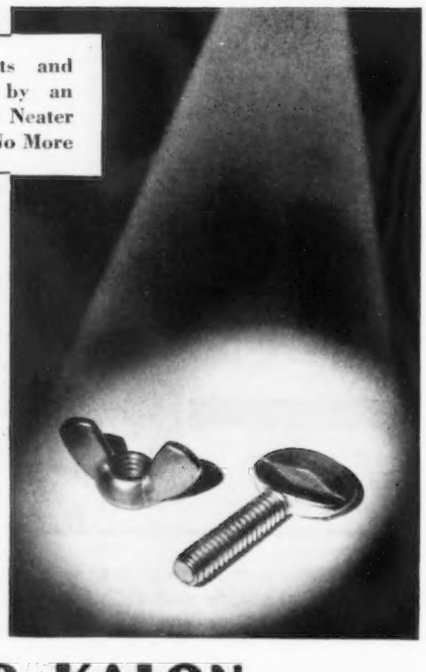
Malone, N. Y., 100 tons, post office.

New York, 400 tons, coal shed for New York Edison Co.

It's no longer true—

that ALL Wing Nuts and Thumb Screws are ALIKE

Cold-forged **Wing Nuts and Thumb Screws — made by an Improved process — are Neater and Stronger . . Yet Cost No More**



NOW it pays to buy Wing Nuts and Thumb Screws by name. For there's a real difference between Parker-Kalon *Cold-forged* Wing Nuts and Thumb Screws, and ordinary devices. A difference which brought them to leadership in only a year's time.

Cold-forged Wing Nuts and Thumb Screws are unusually neat in appearance. They are *free from flaws* and other imperfections and take an excellent finish. Their shape and dimensions are uniform. The Nuts are accurately tapped and the Screws are rolled-threaded to close limits.

Let us send samples for comparison. See why it pays to specify "Parker-Kalon *Cold-forged*" when you buy Wing Nuts and Thumb Screws. SOLD BY RECOGNIZED DISTRIBUTORS.

PARKER-KALON
Cold-forged
WING NUTS AND THUMB SCREWS

Send for Free Samples!

PARKER-KALON CORPORATION, 196 Varick Street, New York, N. Y.

Send free samples and prices of ☐ Wing Nuts ☐ Thumb Screws

Name ..... Company .....

Address .....

Pennsylvania Railroad, 500 tons, train shed at Philadelphia.

THE SOUTH

Jacksonville, Fla., 1000 tons, sheet piling for Matanzas Inlet dike, Intercoastal waterway; bids at United States Engineer Office, May 28.

State of Texas, 1100 tons, bridges.

CENTRAL STATES

Jackson County, Ind., 540 tons, bridges, Vincennes Bridge Co. low bidder.

Manistee, Mich., 900 tons, highway bridge.

Sault Ste. Marie, Mich., 700 tons, bridge.

Detroit, 340 tons, transfer building for Pere Marquette Railroad.

Detroit, 250 tons, drive-away bridge for Chrysler Corpn.

State of Illinois, 1300 tons, bridges.

Peoria, Ill., 150 tons, State highway bridge.

State of Minnesota, 975 tons, highway bridges at Willmar and Albert Lea.

WESTERN STATES

Bonneville County, Idaho, 125 tons, State subway; bids May 29.

Bonneville, Ore., 1500 tons, power house substructure for dam; bids about July 1.

Bonneville, 150 tons, navigation locks at dam; bids about July 1.

State of Oregon, 350 tons, bridge at Florence.

Grand Coulee Dam, Wash., 775 tons, trash gates.

FABRICATED PLATE

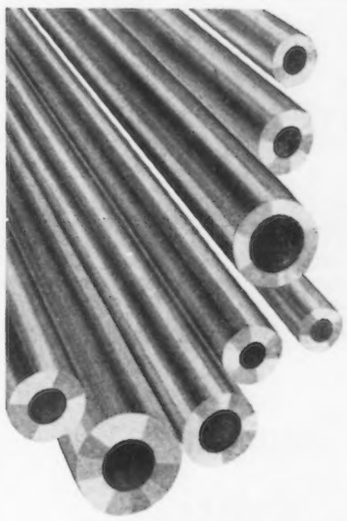
AWARDS

Portland, Me., 745 tons, two tanks for Shell Eastern Petroleum Co., to Chicago Bridge & Iron Co.

Crystal Falls, Mich., 125 tons, 200,000-gal. elevated tank, to Chicago Bridge & Iron Co.

Chama, N. M., 485 tons, spillway lining for dam, to Wyatt Metal & Boiler Co.

Sacramento, Cal., 350 tons, pontoons for United States Engineers, 175 tons each to California Steel Products Co. and Pacific Coast Engineering Co.



TOOL STEEL TUBING

NON-SHRINK
OIL HARDENING
NON-DEFORMING

for RING DIES
CUTTING DIES
SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO Tungsten Carbide drawing dies for wire, rod and tubing.

THE BISSETT STEEL CO., INC.
945 E. 67th ST. CLEVELAND, OHIO
Cincinnati Worcester Buffalo

Los Angeles, 500 tons, tanks for Balboa Brewery Co., to Southwest Welding Co.

Boulder Dam, 150 tons, discharge liners, to Consolidated Steel Corpn.

NEW PROJECTS

Bridgewater, Mass., 175 tons, standpipe and elevated tank.

Louisville, Ky., 775 tons, 50 pontoons, Ingalls Iron Works low bidder; 150 sections 20-in. pipe, Midland Barge Co. low bidder.

Kansas City, Mo., 200 tons, tanks for Goetz Brewery.

Bonneville, Ore., 5150 tons, penstocks.

Oakland, Cal., 1500 tons, 20 to 36-in. pipe for East Bay Municipal Utilities District; bids taken May 23.

Mill Lease Will Affect St. Louis Scrap Mart

ST. LOUIS, May 22.—The Sheffield Steel Co. of Kansas City, a subsidiary of the American Rolling Mill Co., is reported to be concluding negotiations for the leasing of the eastern section of the plant of the Scullin Steel Co. here, including the rolling mill and six of the 11 open-hearth furnaces. It is expected that operations will be started by the Sheffield company here in about 30 days. The Sheffield interests are large users of scrap iron, and it is expected here that their entry into this market will tend to strengthen that commodity, which has been adversely affected by inactivity at the Scullin plant.

Because of a lack of buying in recent weeks, the scrap market has sustained further declines of from 25c to 75c a ton. Dealers have completed all contracts with local mills, and have a few outstanding orders with consumers in other markets. Selected heavy steel, miscellaneous standard-section rails, No. 1 busheling, railroad springs and cast iron borings, are 25c a ton lower; No. 2 railroad wrought, heavy turnings, No. 1 railroad wrought, steel rails less than 3 ft., and railroad malleable are 50c lower, and rails for rolling are 75c off.

While very little new business in finished steel has been placed, specifications are reported to be coming in very fast for sheets, especially from the stove trade and warehouses. Demand for wire products, also is better. Especially noticeable is the call for better quality fencing, thicker gages being specified, whereas the tendency a year ago was to buy light-weight fencing.

The lull in buying of pig iron following the heavy ordering prior to the advance in price continues, but shipments against contracts so far in May have been slightly heavier than in the corresponding period last month. The stove foundries in the district are said to be holding up remarkably well in their melt.

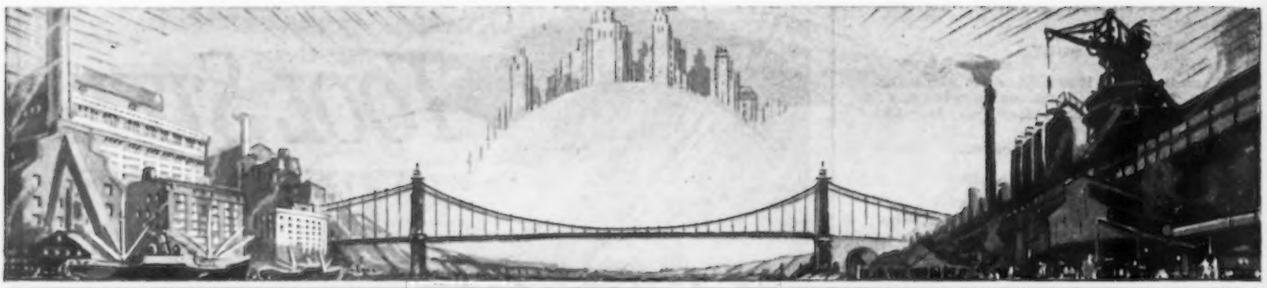
Buffalo Output in Further Decline

BUFFALO, May 22.—Fourteen open-hearths are operating at Bethlehem's Lackawanna plant this week as against 16 before. Republic Steel Corpn. is operating four, and Wickwire-Spencer two. The Seneca sheet division of Bethlehem is running at 80 to 90 per cent of capacity.

A local fabricator of structural steel has obtained the contract for 1200 tons for a grade crossing elimination of the New York Central at Palmyra, N. Y.

Foundry melt throughout the district is holding up well and shipments of pig iron are fairly good. There is a little spot buying but no large inquiries are out. Operations of blast furnaces remain as before.

Demand for scrap has fallen off in keeping with tapering steel mill operations. Most of the consuming mills are restricting shipments by rail because of the heavy receipts of material by barge and from the upper Lake. It is probable that no considerable buying of scrap will take place for another six weeks. No important transactions took place during the past week.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Buying Sluggish With Detroit Prospects Better

ALTHOUGH continued disinterest in machine tool purchases is reported from most industrial centers, prospects in the Detroit area are somewhat improved. Both the Pontiac and Packard companies are likely to enter the market in the near future and a large parts company is said to be figuring on the purchase of a number of machine tools. Reported reciprocal manufacturing arrangements between the Ford Motor Co. and a large French automobile company are likely to bring out some tool business.

New inquiry is still appearing in fair volume, but has fallen off considerably in the last two weeks. A European buyer has placed orders for two milling machines, but export business is otherwise featureless.

NEW ENGLAND

Waterbury Mason Supply & Coal Co., Waterbury, Conn., plans bulk oil storage and distributing unit, 40,000 gal. capacity, at new plant at Dover and Benedict Streets. Cost over $35,000 with material-handling and other equipment for building supply storage and distribution. Henry T. Butler, Bridgeport, is architect.

Hicks, Hirst & Co., Inc., Taunton, Mass., has been organized by Albert E. Hicks and William Hirst, 272 Centre Street, Bridgewater, Mass., to manufacture iron castings and operate a general jobbing foundry.

A. & G. J. Caldwell, Inc., Merrimac Street, Newburyport, Mass., is making extensions and improvements in local buildings for new distillery, and will erect storage and distributing building and other units. Cost over $150,000 with equipment.

E. Ingraham Co., Bristol, Conn., manufacturer of clocks, etc., has let additional contracts to Torrington Building Co., Torrington, Conn., for two additions, six-stories, 50 x 120 ft., and five-stories, 78 x 98 ft., first noted for general production and latter unit for storage and distribution. Cost over $100,000 with equipment. Company is also considering erection of one-story garage unit for company cars, 66 x 67 ft.

NORTH ATLANTIC

International Harvester Co., 122 East Forty-second Street, New York, motor truck division, with headquarters in Chicago, has leased foundry of Jno. Williams, Inc., 567-47 West Twenty-sixth Street, and will remodel for new factory branch.

Ebling Brewing Co., 937 Fulton Street, Brooklyn, plans extensions and improvements in branch plant at Bridgeport, Conn., including new equipment. Cost about $40,000 with machinery.

Sunrise Oil Co., College Point, L. I., J. T. Marks, president, has let general contract to Briguglio & Schnee, Jamaica, L. I., for new bulk oil storage and distribution unit. Cost over $60,000 with tanks and other equipment.

Colonial Beacon Oil Co., 155 East Forty-fourth Street, New York, has filed plans for new bulk oil storage and distributing plant in Brooklyn. Cost about $125,000 with equipment. C. L. Paul is company architect.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until May 29 for 5000 lb. bronze castings (Proposal 46274); until June 4, 3000 lb. iron castings (Proposal 46296).

Sundstedt Aircraft Corpn., New York, has been organized by Walter H. Messimer and Hugo Sundstedt, 2 West Forty-fifth Street, capital $350,000, to manufacture airplanes and parts.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 1 for two horizontal pumps (Schedule 2556); until June 5, 11,830 lb. steel forgings for turbine rotors (Schedule 2565) for Brooklyn Navy Yard; until June 1, steel forgings for turbine rotors (Schedule 2511) for Brooklyn and Charleston yards; until June 5, sleeve castings (Schedule 2521), for vertical simplex pumps (Schedule 2538) for Brooklyn and Philadelphia yards.

Vendola Corpn., 636 Eleventh Avenue, New York, manufacturer of coin vending machines and parts, has leased about 4000 sq. ft. in building at 109-23 West Sixty-fourth Street for new plant.

Stanley's Roofing & Sheet Metal Works, Inc., New York, has been organized by J. Stanley Peles, 510 West 184th Street, and associates to manufacture metal roofing and other sheet metal products. New organization will take over company of similar name at 525 West 182nd Street.

Scientific Model Airplane Co., 277 Halsey Street, Newark, N. J., manufacturer of aircraft equipment and supplies, has leased about 10,000 sq. ft. in building at 218-20 Market Street for new plant.

Raritan Metal Co., Perth Amboy, N. J., has been organized by Chris Jorgensen, William K. Miller and David T. Wilentz, 265 Madison Avenue, capital $125,000, to manufacture metal products.

Central District, Inc., Bayonne, N. J., recently organized, represented by J. Raymond Tiffany, 37 Newark Street, Hoboken, N. J., attorney, has secured permission from State to construct a marine terminal on waterfront, from Thirty-third to Forty-ninth Street, Bayonne, where tract of 800 acres was recently acquired. Group of multi-story buildings will be built with power house and other mechanical units. Cranes, conveyors, hoists, elevators and other material-handling equipment will be purchased. Financing for $5,000,000 is being arranged for project.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 5 for aircraft tachometers (Schedule 2535), pitot-static aircraft tubes (Schedule 2537), aircraft thermometers (Schedule 2533) for Philadelphia Navy Yard; oil reclaimers (Schedule 2570) for Philadelphia, Anacostia and Quantico Navy yards.

International Resistance Co., Twenty-first and Arch Streets, Philadelphia, manufacturer of radio resistors and kindred equipment, has leased building at 187 Duchess Street, Toronto, Ont., and will occupy with its subsidiary, International Resistance Co., Ltd., 74 Wellington Street, Toronto, doubling present floor space and capacity.

Air Reduction Sales Co., Germantown and Allegheny Avenues, Philadelphia, manufacturer of welding apparatus, industrial oxygen, etc., has awarded general contract to William Steele & Sons Co., Market Street National Bank Building, for one-story addition and improvements in present plant. Cost over $25,000.

Atlantic Sheet Metal Works, Inc., Newark, recently organized, has leased building at 253 Jefferson Street for manufacture of light and heavy sheet metal specialties. F. J. Blandis heads company.

OHIO AND INDIANA

Reliable Pattern & Castings Co., 2822 Spring Grove Avenue, Cincinnati, has plans for one-story addition, 62 x 120 ft. Cost over $35,000 with equipment. Joseph G. Steinkamp & Brother, Mercantile Library Building, are architects.

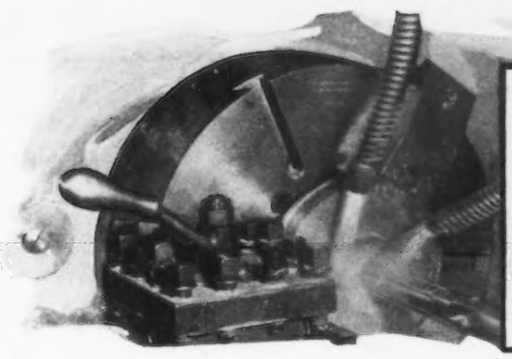
Chillicothe Paper Co., Chillicothe, Ohio, is planning extensions and improvements in power plant, including additional equipment. Cost over $30,000 with equipment. W. I. Barrows, Reibold Building, Dayton, Ohio, is consulting engineer.

Ackerman Rubber & Plastic Molding Co., Cleveland, recently organized, has leased former plant of Stearns Conveyor Co., East 200th Street, Euclid, and will remodel for production of line of hard and soft rubber products. Machinery to cost about $45,000 will be installed. F. J. Ackerman, president and treasurer, was formerly local manager for Olds Motor Works, Lansing, Mich.; A. C. Fulton is vice-president and engineer.

National Distillers Products Corpn., 52 Williams Street, New York, will soon begin superstructure for multi-story addition to branch distillery at Carthage, Ohio, for storage and distribution. Cost over $200,000 with equipment.

Mead Paper Board Co., Chillicothe, Ohio, will make extensions and improvements in

AN AID TO SECURING FULL CAPACITY OF LATHES



because . . .
DEEPER CUTS
HIGHER SPEEDS
are made possible

COMPLETE flexibility, fast metal-removing capacity and ease of operation are embodied in the modern turret lathe. It is a profitable unit for rapid, accurate production of duplicate work, yet gives flexible utility when the machining of a single part is necessary.

SUNOCO Assures Dependable Lathe Performance

Proper tool equipment and its efficient arrangement are necessary in lathe operation, but the cutting lubricant is likewise a vital factor.

With Sunoco Emulsifying Cutting Oil, tool steel, carboloy and tantalum carbide small tools can take deep cuts at surface speeds that utilize the full capacity of the lathe.

Lathe Operators Like SUNOCO

Operators appreciate the advantages of Sunoco . . . it permits increased machine speed, longer runs per tool grind, less lost time in setting up, greater accuracy, better finish and fewer rejects throughout a long run.

It will pay you to get the facts on Sunoco and to test it in your plant. Your correspondence is invited . . . and the services of our cutting oil engineers—of wide experience—are at your disposal.

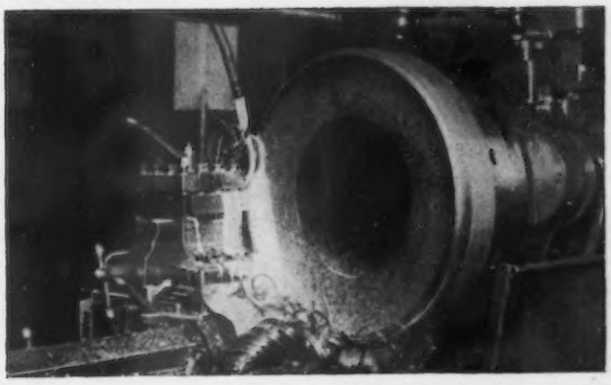
Operation: Turning and drilling gear cluster.
Machine: Warner & Swasey 3-A Turret Lathe.
Material: S. A. E. 1020.
Turning: 160 S. F. P. M.
Drilling: 90 S. F. P. M.
Lubricant: 1 part Sunoco to 15 parts water.

Courtesy of
Warner & Swasey Co.
Cleveland

SUNOCO
EMULSIFYING
CUTTING OIL

Operation: Turning and facing Bull Gear.
Machine: Warner & Swasey 5-A Turret Lathe.
Material: Manganese Steel Casting.
Facing: 140 S. F. P. M.
Lubricant: 1 part Sunoco to 15 parts water.

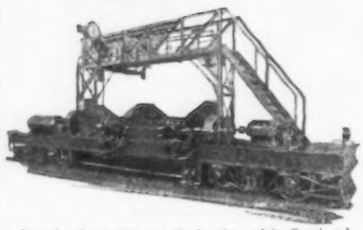
Courtesy of
Warner & Swasey Co.
Cleveland



SUN OIL COMPANY PHILADELPHIA, PA., U. S. A.
Offices and Warehouses in more than 100 Cities

Subsidiary Companies • Sun Oil Co., Ltd., Montreal, Toronto • British Sun Oil Co., Ltd., London, England

ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas-Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.

Engineers - Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

branch mill at Menasha, Wis., to include additional equipment. Cost over $40,000 with machinery.

Pacific Coal & Coke Co., Linton, Ind., plans rebuilding part of plant at local Little Betty coal mine, recently destroyed by fire. Loss close to $80,000 with equipment.

Sibley Machine Co., South Bend, Ind., will soon begin superstructure for one-story foundry addition, 100 x 145 ft., for which general contract recently was let to Ralph Sollitt & Sons, South Bend. Cost over $50,000 with equipment. Frank D. Chase, Inc., 807 North Michigan Avenue, Chicago, is architect and engineer.

Construction Service, Veterans' Administration, Washington, asks bids until June 12 for new incinerator plant at institution at Marion, Ind.

WESTERN PENNA.

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, plans rehabilitation and improvements in machinery at sheet glass plant at Mount Vernon, Ohio, idle for about two and one-half years.

Costanzo Coal Mining Co., Wheeling, W. Va., plans new loading dock at Wellsburg, W. Va., with conveying, elevating, loading and other equipment.

Town Council, Elizabeth, W. Va., plans early call for bids for equipment for municipal waterworks, including 10,000-gal. elevated steel tank and tower, 150,000-gal. steel tank reservoir, turbine and centrifugal pumping machinery and other equipment. Bernard G. Simpson Co., Fairmont, W. Va., is consulting engineer.

Crew-Levick Co., Elverson Building, Philadelphia, let contract to Titusville Iron Works Co., Titusville, Pa., for new power house and certain other work in connection with expansion and improvements at Titusville refinery. Entire project will cost over $200,000 with equipment.

SOUTH CENTRAL

New England Distilling Co., 115 Pike Street, Covington, Ky., has let general contract to George Lubrecht Co., 33 Pleasant Ridge Road, Fort Mitchell, Ky., for one-story storage and distributing plant. Cost $25,000 with equipment. Abner E. Foster, City Hall, is architect.

Board of Trustees, Lafon Boys Home, New Orleans, will take bids soon, through R. L. Moroney, 8134 Sycamore Street, architect, for power house at new group of buildings. Entire project will cost about $85,000.

George F. Stagg Co., Frankfort, Ky., distiller, will soon begin erection of new nine-story storage and distributing plant, 134 x 194 ft. Cost over $175,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer.

Board of Trustees, Institutions of Higher Learning, Jackson, Miss., will receive bids until about June 5 (still to be determined) for new power plant, 56 x 75 ft., at State Teachers' College, State College, Miss., including high pressure boilers, pumps and other equipment. E. C. Hearon & Sons, Carter Building, Hattiesburg, Miss., are architects.

WASHINGTON DISTRICT

Procurement Officer, Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until June 5 for one 35-ft. boom, ¾-cu. yd., grab bucket, hook and dragline bucket (Circular 74); until June 7 one wood tank (Circular 77). Bids will also be asked in June for three universal turret lathes (Circular 75).

Consolidated Beef & Provision Co., 100 South Exeter Street, Baltimore, meat packer, will soon take bids for two additions, three and four-stories and basement respectively. Cost over $85,000 with equipment. William F. Stone, Jr., 2612 North Charles Street, is architect; James Posey, Baltimore Trust Building, is consulting engineer.

Constructing Quartermaster, Langley Field, Va., asks bids until May 28 for range boilers and stands, heaters, etc. (Proposal 44).

General Purchasing Officer, Panama Canal, Washington, asks bids until May 31 for steel boiler tubes, drill casing, band saws, welding rods, steam gages, goggles, etc. (Schedule 2964); until June 5, steel stud bolts, manganese bronze bars, brass washers and bolts, wire cloth, I-bolts, track bolts, cable clips, copper wire cloth and other equipment (Schedule 2995).

Board of District Commissioners, District Building, Washington, asks bids until June 5 for 44,319 lb. iron furnace castings.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 29 for 28,000 sq. ft. copper wire cloth (Schedule 2554) for Sewall's Point, Va., Navy Yard; until June 5, two hydraulic presses (Schedule 2559) for St. Juliens Creek Navy Yard.

BUFFALO DISTRICT

Common Council, Lockport, N. Y., is arranging financing for $60,000 for new municipal incinerator plant, with furnaces, conveyors, loaders and other equipment.

Auto Safe Corpn., Buffalo, has been organized by Clarence W. Bauer, 425 Glenwood Avenue, and George A. Hof, 751 Tacoma Avenue, to manufacture automobile locks, locking devices, etc.

Easy Washing Machine Co., Ltd., 187 Geary Avenue, Toronto, Ont., manufacturer of electric washing machines and parts, affiliated with Easy Washing Machine Corpn., Syracuse, N. Y., has leased former plant of Riley Engineering & Supply Co., Ronald and Shell Avenues, and will occupy early in June for new plant. Expansion in manufacture at new location will include electric ironing machines and parts, a new branch of output.

SOUTH ATLANTIC

Town Council, North Wilkesboro, N. C., asks bids until June 7 for centrifugal pumping machinery and accessories, two steel storage tanks, steel water tank and tower, pipe lines, etc., for municipal waterworks. Gilbert C. White Co., Durham, N. C., is consulting engineer.

Tampa Shipbuilding & Engineering Co., Tampa, Fla., Ernest Kreher, president, has begun erection of first unit of new dry dock, with three additional units to be built immediately following, entire structure to occupy 1425 ft. waterfront. Project will include shops for iron and steel work, wood-working, metal working, etc. A fund of $750,000 has been secured for project through Federal aid.

Textile Spindle & Roll Corpn., Charlotte, N. C., has been organized by E. C. Clark and R. B. Cochran, 922 Magnolia Avenue, to manufacture textile machinery and parts.

Piedmont Mining Co., Gaffney, S. C., David Banta, head, plans purchase of centrifugal pumping machinery, chain type bucket elevators, dragline with two buckets and other equipment for placer gold-mining operation.

MIDDLE WEST

Rotary Electric Machine Mfg. Co., Chicago, recently organized, has leased one-story building at 4121 West Lake Street, about 6000 sq. ft. floor space, for new plant.

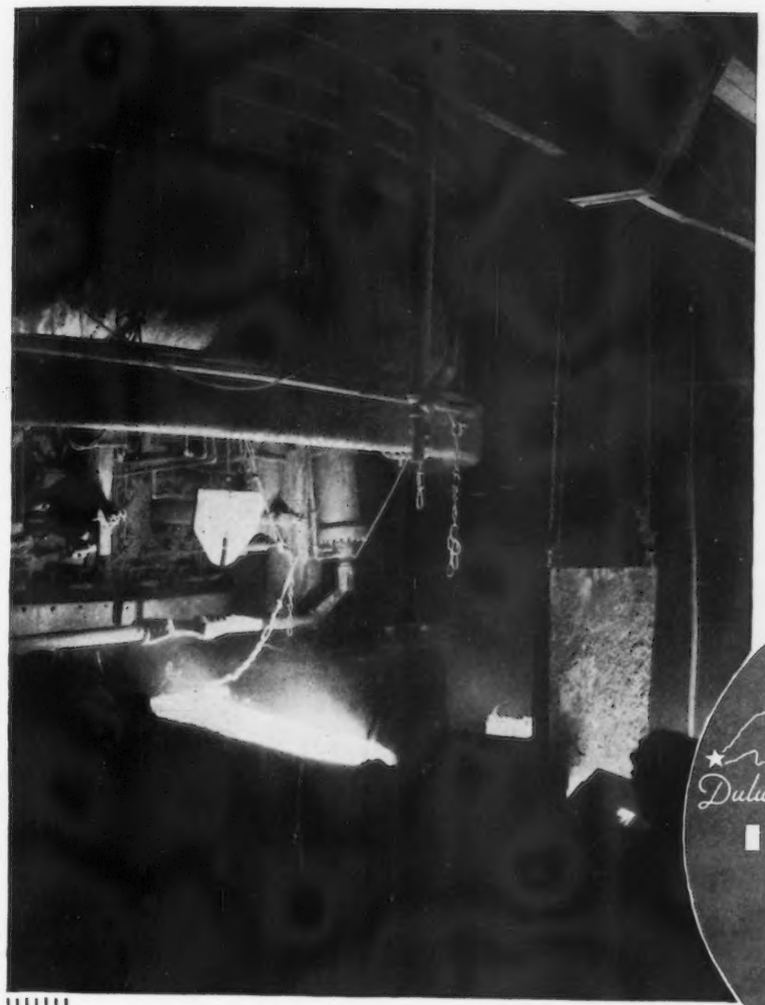
Sinko Tool & Mfg. Co., 351 North Crawford Avenue, Chicago, manufacturer of tool specialties, etc., has let general contract to A. W. Jensen, 192 North Clark Street, for one-story top addition, 95 x 125 ft. Cost about $40,000 with equipment. A. E. Strobel, last noted address, is architect.

Anderson-Taylor Tool Works, Inc., Room 1538, 10 South La Salle Street, Chicago, has been organized by George A. and Clarence M. Anderson, and John Taylor, to manufacture tools and mechanical equipment.

City Council, Benson, Minn., will ask bids soon for extensions and improvements in municipal electric light and power plant, including boilers, superheaters, stokers, etc. Fund of $50,000 has been arranged. Burlingame & Hitchcock, Sexton Building, Minneapolis, Minn., are consulting engineers.

Loup River Public Power District, Columbus, Neb., lately organized to carry out hydroelectric power and irrigation project on Loup River, has engaged Harza Engineering Co., 20 North Wacker Drive, Chicago, and Fred Albert, Columbus, consulting engineers, to prepare plans and supervise construction. Two main hydroelectric generating stations will be built, 49,500-hp. and 9000-hp., capacity respectively, with transmission lines to points near Sioux City, Lincoln and Omaha, Neb. Electric-operated pumping stations will be built for irrigation service. Fund of $1,300,000 has been secured through Federal aid.

Northern Pacific Railway Co., Railroad Building, St. Paul, Minn., has plans for addition to engine house and shop at Missis-



WITH modern blast furnace and coke oven plants at Chicago, Toledo, Erie and Duluth, Interlake Iron Corporation is strategically located to fulfill pig iron and coke requirements of gray iron and malleable foundries serving automotive, machine tool, railroad equipment, agricultural equipment, and other industries.

PIG IRON . . *All Grades*

FEDERAL PERRY
TOLEDO ZENITH

COKE . . . *For Foundry, Industrial and Domestic Uses*

CHICAGO SOLVAY PERRY
TOLEDO ZENITH

INTERLAKE IRON

CORPORATION

PLANTS CHICAGO DULUTH TOLEDO ERIE

PIG IRON

PICKANDS MATHER & CO. SALES AGENTS

CLEVELAND CHICAGO DETROIT ERIE TOLEDO MINNEAPOLIS DULUTH

COKE

sippi Street yards. Cost about $25,000 with equipment. O. M. Rognan is company architect.

Minnesota Mining & Mfg. Co., 1015 South Second Avenue, Minneapolis, Minn., has plans by Toltz, King & Day, local architects, for new crushing and screening plant at branch quarrying plant at Wausau, Wis. Upon completion several other units will be built. Cost about $75,000. L. A. Hatch is manager at Wausau.

Rusk County Board, Ladysmith, Wis., has engaged G. A. Krasin, architect, Marshfield, Wis., to design garage and machine shop, ell-shaped, 60 x 120 and 50 x 40 ft., for County highway department, costing about $30,000 with equipment. Bids will be taken about May 28. D. J. Summerville is County highway commissioner.

MICHIGAN DISTRICT

East Side Gear & Tool Co., 2981 Charlevoix Avenue, Detroit, plans one-story addition. Cost over $25,000 with equipment.

Lewis M. Rishel, Holland, Mich., has purchased former factory of Grobheisel Cabinet Co., Sturgis, Mich., and will remodel for manufacture electric-operated hot air furnaces and parts.

Jordan Machine Products, Inc., 3611 St. Aubin Avenue, Detroit, has been organized by Herman Jordan, 5365 Holcomb Avenue, and associates, to manufacture machine and mechanical equipment, parts, etc.

Wilson Packing Co., Mason, Mich., food products, has plans for one-story packing plant, 90 x 165 ft., to replace a unit destroyed by fire several months ago. Cost about $70,000 with equipment.

Industrial Machine Tool Co., Fenton, Mich., plans rebuilding part of plant recently destroyed by fire. Cost about $27,000 with equipment.

John Spousta, Owosso, Mich., has taken over St. Johns Foundry, St. Johns, Mich., idle for several years, for production of line of automotive and other castings.

SOUTHWEST

Cushing Refining & Gasoline Co., Cushing, Okla., has plans for new gasoline refinery, with storage and distribution facilities. Cost about $100,000 with equipment.

Missouri-Pacific Railroad Co., St. Louis, plans rebuilding part of grain elevator at South St. Louis, recently destroyed by fire. Loss about $50,000 with equipment.

General Mining Corpn., Yellville, Ark., J. H. Hand, vice-president and general manager, has taken over large zinc and lead properties for development and operation. Plans are under way for new electrolytic smelting plant. Cost over $80,000 with machinery. Charles H. LaVasseur, Yellville, is consulting engineer.

All-Steel Products Co., 805 South Wichita Street, Wichita, Kan., manufacturer of steel specialties, has let general contract to Aaron Wilson Construction Co., 217 South Terrace Drive, for one-story addition, 60 x 120 ft.

City Council, Houston, Tex., has called special election on June 16 to approve bonds for $2,502,000 for extensions and improvements in municipal waterworks, including new pumping equipment and accessories, pipe lines, etc.

Purity Products Co., Mineral Wells, Tex., plans new one-story plant, 40 x 130 ft., for production of rock water crystals and by-products, to include installation of mechanical drying machinery, refrigerating equipment, pumping machinery, evaporation equipment, etc. Cost over $45,000 with machinery. W. G. Agee, Mineral Wells, is architect. H. C. Christopher is secretary.

PACIFIC COAST

Weiland Brewing Co., 240 Second Street, San Francisco, plans extensions and improvements in brew-house, bottling works, storage and distributing departments, to include additional equipment. Cost about $150,000 with machinery. Herman Noethit, address noted, is company engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 29 for motor-driven turret lathes (Schedule 2416) for Puget Sound Navy Yard; until June 5, 25,000 ft. brass pipe (Schedule 2547), acetylene gas cylinders (Schedule 2544), 4555 lb. sheet copper (Schedule 2548) for Mare Island yard.

Master Oil Burner Co., 805 Dexter Avenue, Seattle, Walter Klimpel, president, manufacturer of oil burners and oil-burning equipment, plans one-story foundry, 120 x 240 ft., adjoining new one-story assembling plant, now in course of erection. Proposed to begin work on new unit in 60 to 90 days. Cost over $50,000 with equipment.

Bureau of Reclamation, office of Columbia Basin Commission, Civic Building, Spokane, Wash., asks bids until June 18 for construction of Grand Coulee dam and power plant. Power station will be designed for three initial units, each 105,000-kw. capacity. (Bids for equipment will be asked under separate contracts.) F. A. Banks, Almira, Wash., is engineer.

Shaffer Pulp Co., 1502 Taylor Way, Tacoma, Wash., will soon begin superstructure for new one-story machine shop.

Crown Consolidated Mines Co., Reno, Nev., care of W. J. Loring, Virginia City, Nev., president, recently organized to operate gold and silver properties near Golconda, Nev., plans installation of drilling, hoisting, conveying and other equipment for mining. Company is arranging financing for $250,000, considerable part of fund to be used for purpose noted. H. O. Hall, Reno, is vice-president and treasurer.

FOREIGN

Mufulira Copper Mines, Ltd., London, England, plans expansion and improvements at mining properties, including machinery, extensions in present machinery units and new smelting plant. Facilities will be provided for treating about 2,000,000 tons of ore a year, yielding about 700,000 tons copper. Company has arranged bond issue of £1,000,000 (about $5,000,000), majority of proceeds to be used for purpose noted.

Compania Empacadora Mexicana, S. A., Lechaeria, Mexico State, Mexico, meat packer, has plans for new multi-unit plant, with power house, machine shop and other units. Cost about 4,000,000 pesos (approximately $1,112,000) of which more than $600,000 will be expended for machinery.

Soviet Russian Government, Moscow, is planning purchases of equipment for oil drilling, oil storage and distribution, pumping machinery, gasoline refinery and allied equipment for crude and refined oil. It is expected to arrange for certain purchases in United States and a commission of Soviet executives and engineers will soon arrive here for that purpose. Amtorg Trading Corpn., 261 Fifth Avenue, New York, is official buying agency and will be headquarters for commission noted.

Technical Committee Reports on Steel Extras

(Continued from page 15)

cations for tubular products. The standard chemical ranges and allowable variations therefrom, as established by the association, were promulgated and generally accepted before the advent of the code.

Cooperation With Other Bodies

For a number of years past the Rail Committee has been giving full cooperation to the American Railway Engineering Association in connection with specifications and special tests of rails in service. Present specifications for rails, tie plates and spikes are the result of joint committee work between the A.R.E.A., A.A.S.M.T.C. and A.S.T.M.

The association has always worked in concord with the American Society for Testing Materials and, while the association has in the past promulgated numerous specifications for steel products, at the present time its policy is to refrain from specification writing, except by cooperation with other organizations. It believes that its activities will be of greater benefit to the industry if confined to studying the many variables covered by existing specifications, to standardizing mill tolerances for commercial and special products, and the rationalizing of chemical and physical requirements in order that they may conform with accepted mill practices.

In 1930 the name of the group was changed to "Association of American Steel Manufacturers' Technical Committees," in order to indicate more clearly the purpose and activities of the organization.

The foregoing has been placed in this paper for the purpose of showing the background of the Technical Committee, the members of which have been active in the affairs of the A.A.S.M.T.C. Most of them are chairmen of standing committees and three are past presidents of the association.

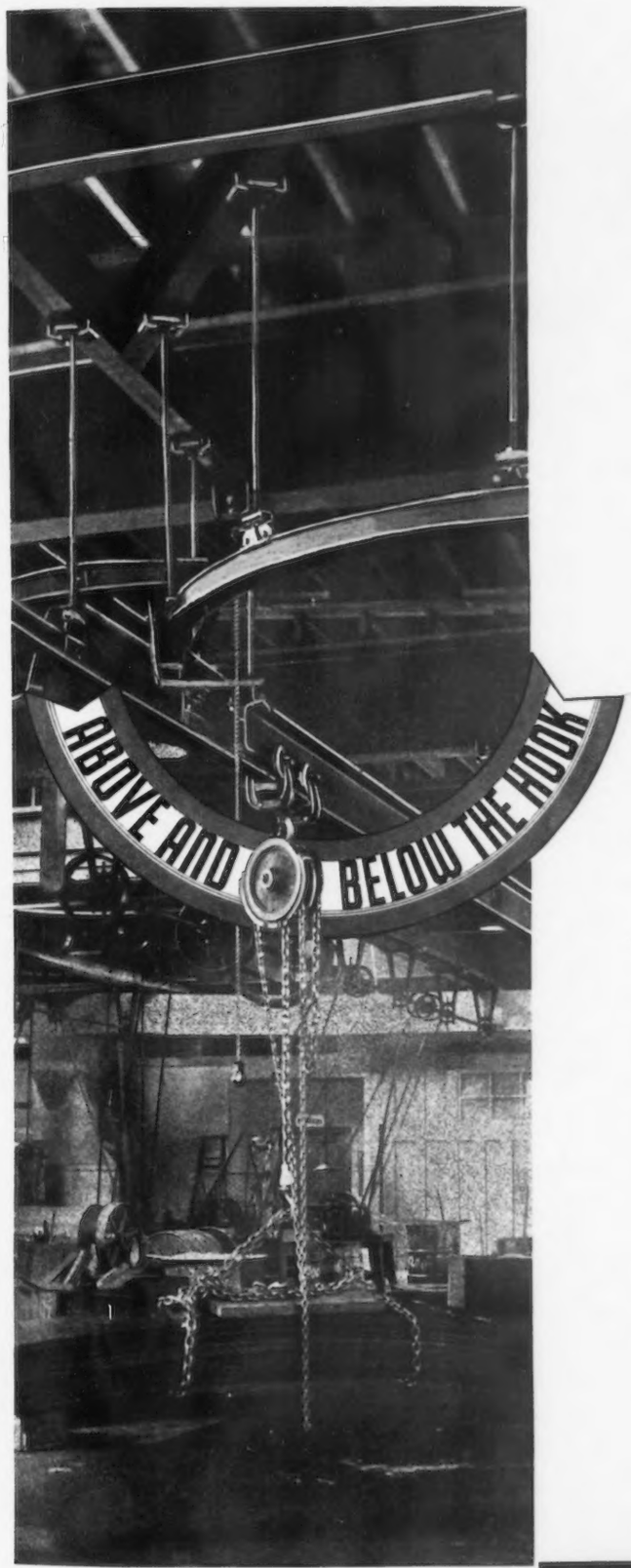
Study of Extras Undertaken

Time has proved that the program outlined at the organization meeting was sufficiently comprehensive to keep the committee busy. Many of the members have devoted a large part of their time to the work; and at its first regular meeting, held Jan. 12, the committee was advised that it would be expected to make a thorough study of "extras," from a purely technical standpoint. We realized then, that a real job confronted us.

The first part of the program has been fairly well covered, recommendations having been submitted to the Administrative Committee of the institute for a total of 20 sections as now shown in the book of "Uniform Extras and Deductions." Certain sections have been less thoroughly studied than others solely because of lack of time. Some of the sections were drafted several times before they were considered suitable for submission but this does not mean that these are perfect, possibly far from it.

Standardization Difficult

Competition should be based on the technical details of a specification and certain requirements in a specification calling for a definite quality of material should be interpreted by all manufacturers in the same manner. I believe no one will take exception to this. There have been numerous specifications which call for a restricted tensile range and it needs no argument to indicate that where such restricted ranges are required an



"Above the Hook" problems are solved by the correct combination of Osborn Tramrail units.

"Below the Hook" problems are solved by the correct Osborn-designed Grab equipment.

ADVANTAGES OF OSBORN TRAMRAIL SYSTEMS ARE PREDETERMINED!

•

Before You Invest

Osborn studies your materials handling problems at no obligation to you.

Before You Invest

Osborn recommends the most practical Osborn-designed Grab equipment to pick up the loads.

Before You Invest

Osborn suggests the correct combination of Osborn Tramrail units to convey the loads, via the overhead route, with speed, safety and economy.

Before You Invest

in materials handling equipment . . .
INVESTIGATE Osborn Tramrail Systems!

THE OSBORN MANUFACTURING COMPANY
5401 HAMILTON AVE., CLEVELAND, OHIO, U. S. A.

OSBORN
TRAMRAIL SYSTEMS

additional manufacturing hazard is involved. Other specifications stipulate chemical ranges which cannot be met or, if possible to do so, only with extreme difficulty. Much of the time of the committee has been given to studying such types of specifications with a view to eliminating unreasonable requirements or, by establishing a standard procedure, avoiding the troubles which have resulted from specifications of this type.

In carrying out the first part of the program the committee endeavored to harmonize the various sections, particularly with reference to chemical ranges and requirement. On first thought this appeared to be fairly simple and easy to accomplish but as the work progressed, many instances were encountered which did not permit such treatment. It was found that users of wire and wire products were accustomed to different chemical ranges than those set up for bars and semi-finished, likewise, the requirements for plate material could not be standardized with other products as completely as seemed desirable. The numerous instances of this nature which were brought to light convinced the committee that more harm than good would result from any attempt to hold too rigidly to a standardization ideal which, while highly desirable from a technical standpoint, might be objectionable to users of many products.

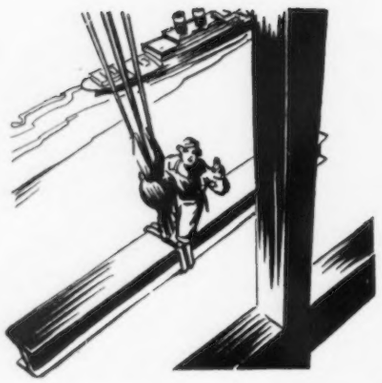
Chemical Ranges Now Common to Most Products

With the exception of some special products, certain commodities covered by definite specifications and some standard specifications, the chemical ranges as now shown in the section on semi-finished steel are applied throughout the various sections of the book. The committee has recommended that the "Manufacturers' Standard Limits in Chemical Composition. . . ." "Manufacturers' Standard Permissible Variations on Check Analysis" and "Manufacturers' Standard Methods of Sampling for Check Analysis," be placed as an appendix in the book instead of being shown in each of several sections.

The use of phraseology so definite as to permit no other interpretation than that intended has been no small problem for the committee. It has been very conclusively shown that "intent," particularly where extras are involved, has no weight unless so clearly indicated that misinterpretation is impossible. This is well illustrated by the following examples:

Where Misunderstanding Arises

Included in the "Extras for Chemical Specifications" as set up in the section on bars, are those for varying ranges of manganese. A note under the list of such extras reads as follows: "When the mean of the range agreed upon is above 1.15 per cent



the extra shall apply only to steel with maximum carbon specified 0.20 per cent or higher." To the steel manufacturer, the intent in this statement is perfectly clear, meaning to him that a carbon content *lower* than 0.20 per cent cannot be specified with the stated manganese range for the extras shown; the intentional misinterpretation of the above note assumes that, for any carbon *under* 0.20 per cent the note does not apply and an extra may or may not be assessed, depending upon expediency. Low-carbon high-manganese steels cannot be made except by the use of a special ferro-manganese, practically carbon-free, the cost of which is much greater than that of the standard ferro-alloy ordinally used.

It will be readily understood that a change in the "note," or an addition thereto, would become necessary and the Technical Committee therefore recommended phraseology which clarified the intent and an increase in the extra commensurate with the increased cost of production. This instance is typical of many which demanded the attention of the committee and it is quite possible that statements still remain which are not sufficiently clarified to be entirely free from possible misinterpretation.

The Basis for Manufacturing Cost Differentials

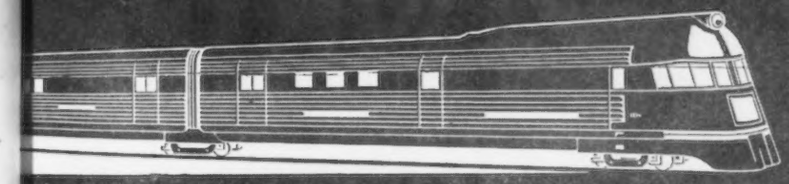
The question of manufacturing cost differentials which is reflected in the established "Extras" appears to be the subject of a great deal of misunderstanding and, from some quarters, severe criticism. Extras are pretty well understood by the experienced steel buyer, but to those not familiar with the purchase and use of steel and, to some extent with its manufacture, extras are sometimes open to suspicion. While the Technical Committee has not completed its study of extras, considerable information has been obtained and this phase of the work will continue until the data secured on various products are sufficiently comprehensive to permit the compilaton of average manufacturing cost differentials representative of the industry. It may be well for us to give some thought in considering the basis on which extras are assessed, with the idea of bringing out definite points with the hope that such clarification of the subject may help to give both the layman and the buyer a better understanding of the subject, and to allay as much as possible the tendency toward unfavorable criticism from uninformed sources.

In considering manufacturing cost differentials, the Technical Committee has no interest in the base cost of ingots except as this may be influenced in the chemistry and open-hearth practice involved. However, immediately with the changing of the ingot into some other product, certain definite costs are incurred. Such costs, continuing through each conversion must be taken into account and reflected either in the base price or through the application of an extra.

As a base price product on which we are justified in building our extras, we may consider that which is produced at a minimum cost with the greatest production rates. The user of bars, which are produced without pickling and chipping of billet, should not be expected to pay for such refinements where a lower grade material will answer the purpose. Likewise, a wide variety of products made from bars necessitates the pickling and chipping of billets and a heavy discard. Certainly the user of this class of product should pay an extra for the greater demands which he makes upon the material. The buyer of plates used in the manufacture of a product requiring a surface practically free from defects, because of the kind of finish put upon the fabricated product, should understand that much greater preparation of slabs is required than would be the case were the plates to be used in fabricating ordinary tanks. This means, for the higher class product, that slabs must be "laid down" and chipped for the removal of surface defects. Here we have definite labor costs added to the mill slab cost and what could be more logical than asking the buyer of the more highly refined product to pay an extra for such requirements?

Sheet products, because of the multiplicity of uses, the demands for physical qualities which permit extremes in deformation, surfaces which will permit highly polished finishes and extremely close gage requirements for certain types of die operations, present a classification that requires the application of extras in order to carry on business with any possibility of fairness to both buyer and seller. Specifications requiring close chemical limits mean that additional cost is entailed, not only because of the greater difficulty in properly making the heat in the open-hearth furnace itself but also on account of the hazard involved from "off-heats." There are numerous specifications in which the chemistry demanded is within such a range that, when the heat made for application against the order, fails to come within the specified range and

WELDED WITH MUREX FOR QUALITY



the engine bed and crankcase of the Burlington "ZEPHYR"

On the Burlington's new streamlined train the engine bed, supporting the engine, generator and forward half of the power car, is fabricated by welding from plates of Luken's Cromansil, a new high strength steel. The bed, which weighs only 6060 lbs., carries a load of 60,000 lbs. The train is powered by a 600 h.p. Winton Diesel engine...weighing only about 22 lbs. per h.p. ...and equipped with a crankcase of welded steel construction. Both bed and crankcase were designed and built by Lukenweld, Inc. The electrodes used in this welding were Murex Electrodes.

Special Murex Electrodes are now available for welding all of the new high strength steels such as Cromansil. Like other Murex Electrodes, they assure welds of highest quality and help to keep down welding costs by depositing more metal per hour as well as per pound of electrode consumed. In addition, they provide weld metal with physical properties equal in every respect to those of the parent metal.

The superior qualities of Murex Electrodes are due to their heavy, all-mineral coating. The principle and operation of this coating are fully described in a comprehensive booklet. May we send you a copy?

★ MUREX

Heavy Mineral Coated ELECTRODES

METAL & THERMIT CORPORATION, 120 BROADWAY, NEW YORK

ALBANY CHICAGO . PITTSBURGH SOUTH SAN FRANCISCO TORONTO

is, therefore, an "off-heat," there may be no outlet for the steel.

Close Physical Limits Boost Costs

Specifications which demand close physical limits can be met only at an increased cost and both the restricted chemical requirements and those under the heading of physical requirements have been covered by the committee in various sections of the book through the introduction of extras for "restricted requirements."

There should be no attempt made to deprive a user of steel of close chemical and physical limit material, if such requirements are considered necessary, in the manufacture of a product with which he is concerned. Where such restrictions are demanded, it seems reasonable to take care of the situation by assessing a proper extra which fairly represents the increased cost involved. If it were left to the production departments of the various mills to decide what class of product it would be their preference to make, it is, I believe, a safe assertion that they would not select products, which, generally speaking, were subject to extras. While it is presumed that extras cover the actual cost incurred in producing the material, some of the factors affecting such costs are more or less indeterminate and it is questionable whether the extras, in many cases, cover the total costs.

Extra Charges Probably Too Low Rather Than Too High

That the basic idea of extras is sound may be assumed from the fact that they have been a part of the steel business for many years and with the careful study given to mill costs during recent years, extras have been established as fair and equitable. Notwithstanding the greater refinements in the manufacture of certain products made possible during the past few years, it is doubtful whether careful analytical study of mill costs will tend toward any general lowering of extras. The opposite may be quite possible because of increased wages and shorter hours in the industry.

The Technical Committee has, in addition to the work outlined in this paper, been called upon to make recommendations for the correct technical descriptions and classifications of products filed with the Iron and Steel Institute, and to consider technical questions involved in complaints. The Technical Committee has found, after studying certain product classifications and after making recommendations concerning them, that the Commercial Committee could not adopt the recommendations because of commercial aspects which were based upon trade usages of long standing. By cooperation with the Commercial Committee, it has been possible to come to a better understanding of all the factors entering into the handling of the various products.

Technical Committee memberships:

Alan Wood Steel Co—V. H. Lawrence.
American Rolling Mill Co.—E. F. Lundeen.
American Iron and Steel Institute—C. M. Parker, secretary.
Bethlehem Steel Co.—E. F. Kennedy.
Carnegie Steel Co.—J. O. Leech.
Corrigan-McKinney Steel Co.—C. H. Butts.
Illinois Steel Co.—R. G. Glass.
Inland Steel Co.—L. S. Marsh, chairman.
Jones & Laughlin Steel Corpn.—J. J. Shuman.
National Steel Corpn.—J. D. Gold.
Otis Steel Co.—T. C. Perkinson.
Pittsburgh Crucible Steel Co.—E. T. Walton.
Pittsburgh Steel Corpn.—R. S. Simmons.
Republic Steel Corpn.—Earl Smith.
Sharon Steel Hoop Co.—C. W. Wessner.
Tennessee Coal, Iron & Railroad Co.—C. U. Cook.
Youngstown Sheet & Tube Co.—G. A. Reinhardt.

X-Ray Examinations of Metal Defects

(Concluded from Page 14)

One quantitative work on the sensitivity of gamma-rays was performed last year by J. T. Norton and Alfred Ziegler, of the Massachusetts Institute of Technology. Their method of experimentation was somewhat similar to that used to obtain the X-ray data in this article. Using gamma-rays, the experimenters studied the sensitivity by obtaining gammagraphs of blocks of iron of various thicknesses. The results showed that when the sensitivity was expressed in a percentage of thickness of the object it had nearly a constant value of about 1.3 per cent in the thickness range from 2 in. to 6 in. This sensitivity is considerably under the values obtained in ½ to 1 in. specimens by using X-rays as described herein.

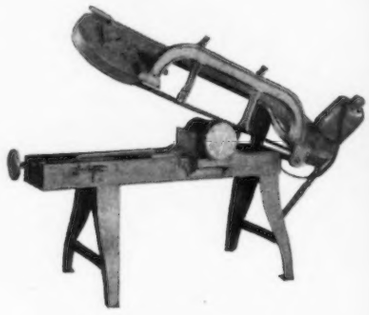
Dealing with actual shop welds, G. E. Doan came to the conclusion that the degree of definition and the sensitivity of the gamma-ray method seemed to be adequate to reveal the flaws which are present in improperly made welds. Mr. Doan used welds about 1 in. thick, and he judged the sensitivity to be about 2 per cent of the total thickness examined.

Although the experimental results seem to point toward greater accuracy for thicknesses up to 3 in. by using X-rays, the final decision must rest on purely laboratory experimentation. Within the next year, additional tests at the Bell Laboratories and the results obtained by Lieutenant Linke should serve to clarify to a great extent the relative merits of X-rays and gamma-rays.

Metal Cutting Band Saw of Horizontal Type

HIGH speed and accuracy are claimed for the metal cutting band saw illustrated, which is being built in 4 and 8-in. sizes by the Wells Mfg. Corpn., Three Rivers, Mich. Cold-rolled machine steel 1½ in. in diameter is said to be cut in 47 sec. and duplicate pieces to be cut with a variation in thickness of less than 0.005 in.

The 1/3 or ½ hp. constant-speed ball-bearing driving motor and the two band wheels that carry the saw blade are mounted in a frame that is strong, but light. The frame is pivoted on the supporting base and counterbalanced by a spring and can be raised easily for inserting the work. It moves down automatically as the cut is made. The motor takes current from any available power or light socket; and power is transmitted directly to the driving band wheel. On the No. 8 machine, helical gears that



are inclosed and run in grease provide a silent and positive drive. The band wheels are mounted in ball bearings and are carried in plates adjusted so that the saw will not run off the wheels even though it may be stuck.

An adjustable weight on the upper part of the saw frame and a spring on the motor end of the frame provide the gravity feed. The saw frame in moving down as the cut is made automatically cuts off the power when the saw reaches the bottom position. The swivel vise on the No. 8 machine is of quick acting type and is arranged to hold work at any angle. Vises can be removed from the bed conveniently to permit handling irregular work.

The Bureau of Standards, Washington, has added standard samples of nickel molybdenum steel (S.A.E. 4615) to its list of standard samples. It has the following composition: Carbon 0.203, managanese 0.661, phosphorus 0.023, sulphur 0.020, silicon 0.290, copper 0.122, nickel 1.75, chromium 0.275, molybdenum 0.214, vanadium 0.004. This standard is No. 111 in the series and costs $2.50 per 150 grams.

WHERE

STRENGTH
SAFETY
UNIFORMITY
DURABILITY

ARE
FACTORS

There is no substitute for **SEAMLESS**

Specify

Pittsburgh Products

Pittsburgh Seamless

STEEL TUBULAR PRODUCTS

Still Tubes, Water Wall Tubes, Refrigeration Piping, Oil Well Tubing—Pipe Coils, Automotive Parts, Superheater Tubes, Steam Lines, Economizer Tubes, Header Tubes, Drill Pipe, Chemical Plant Piping, Boiler Tubes, Locomotive and Air Brake Piping, Heating Systems, Oil and Gas Pipe Lines, Casing, Condenser Tubes, Arch Tubes, Dry Pipes, Mechanical Tubing, Line Pipe, Tank Car Piping. • Any High Pressure Piping—Sizes up to 14″ O.D.—Lengths up to 43 feet, depending upon the Size and Wall Thickness.

PITTSBURGH STEEL COMPANY

New York Detroit Chicago St. Louis Tulsa Houston Los Angeles

ASCO

SPECIAL HIGH GRADE FORGING BILLETS

You cannot afford to be satisfied with less

Life, safety, trouble-free performance . . . all these and more depend upon forgings ● So isn't it good business, therefore, to use only the best forgings you can get? Good forgings depend upon good forging billets. A forging cannot be better than the metal from which it's made ● You're sure of the quality of your forging steel when you insist on ASCO Forging Billets . . . sound dense steel made under the most exacting of metallurgical standards ● Our laboratories are at your service in developing special steels for special purposes.

NRA WE DO OUR PART

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY

Carbon, Chrome, Chrome Molybdenum, Chrome Nickel, Chrome Vanadium, Molybdenum, Nickel, Nickel Molybdenum, Vanadium Billets and Slabs

JUST BETWEEN US TWO

We Ought to Be Flattered

AS partial evidence that your favorite family paper is quoted all over the world, we reproduce this from the April issue of the Japanese *Journal of Metals:*

鉱鉱物等の化學的成分，構造的成分，及び物理的性質
が記載されてある．

設計に關する要素は壓縮，疲勞，强度，摩耗，腐蝕
耐熱性，加工性，磁氣的性質，熱處理等である．

(*Iron Age, Vol.* 132, *pages* 24—7, 1933)

We notice too, that the *Journal* has appropriated some of those tricky little pen and ink sketches sprinkled through our editorial pages, which we take as a tribute to their attractiveness.

The title page of the *Journal* bears a photograph of the type usually found in the newsstand pseudo-art publications, but rarely in the austere metal-working press. A lady of Mae West proportions is fighting a losing battle with single, veil-like garment. We don't quite get the tie-up.

It Makes a Difference

INTO our office the other day wandered a steel salesman, thinking we might be a buyer of steel. We told him that although we could never be a customer of his, as we buy no steel, his company was a customer of ours. "Yes," he said, "I know. You don't realize how much it helps us fellows. I used to work for the So-and-so Steel Company. They don't do any advertising. *It makes a big difference working for a company that backs up its salesmen with advertising.*"

Thirty-Three for One Cent

ONE of our advertising men complains we were too conservative in reporting that the 50,000 readers of ye Iron Age can be reached at a cost of ¼¢ each. That's based on the $116 full page rate, 12 times a year.

If you take the weekly half-page rate of $54, the cost is about 1/10¢ per reader. *At the eighth-page rate of $15 you get 33 readers for a cent,* if, of course, you make your ad so attractive that everybody will read it. But even if some of the 50,000 readers are away fishing or something, it's still a bargain.

They Pick the Winners

"MISTER, won't you please name the best three advertisements in the May 10 issue?" That's a question we addressed to a few hundred readers picked at random. Votes are still coming in, but at present it looks as if the winners are:

First:	Parker Rust-Proof Company	Pages 75-79
Second:	Republic Steel Corporation	Front Cover

Ludlum and Union Drawn Steel are fighting for third place, and Carborundum and Socony-Vacuum are coming up fast. Parker's four-page insert is the most attractive advertisement we have ever seen anywhere. But, as proof that difference of opinion makes horse races, so far a dozen different advertisements have received "firsts." For complete returns see next week's issue.

Winner Take All

IN the cubbyhole next to ours is Clem Read, bridge player of note and participant in major tournaments. Our tremendous will power has enabled us to give up, without solving, the problems he has tried on us from time to time. The latest to floor us is the famous "Whitfield Six," which we are told is the father of all end-game problems:

North
S: None
H: 6 3
D: A 9
C: 8 2

West
S: 7 3
H: None
D: K 10
C: 9 5

East
S: 6 2
H: None
D: 8
C: 7 4 3

South
S: 5 4
H: None
D: Q
C: J 10 6

Hearts are trumps.
South leads.

(With a bow to *Vanity Fair*)

If you can take all six tricks, we would like very much to know how you do it.—A. H. D.